SR 87 Connector Noise Study Report

This report assesses the significance of traffic noise levels on noise sensitive sites for the No Build and Build Alternatives of SR 87 Connector Project from the Intersection of SR 87S and US 90 to SR 87N in Milton.

Santa Rosa County
Florida

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1.0 INTRODUCTION

The primary objective of this ***SR 87 Connector*** project is to extend SR 87S to facilitate north/south traffic movement to more effectively serve freight movement and to provide for a more direct hurricane evacuation route from the coast to areas north in Alabama. It also is the intent to reduce congestion in the City of Milton, and to alleviate travel demand on the section of US 90 currently shared by SR 87. Versions of this project have gone through ETDM screening as ETDM Project # 2861 in 2008. However, that project was much more limited in scope and only evaluated a corridor from SR 87S to Munson Highway. On December 19, 2009 the ***SR 87 Connector*** project was submitted for ETDM review as Project #12597.

In an effort to improve emergency evacuation, and to more effectively meet area commuter's needs, the Florida Department of Transportation is conducting this Project Development and Environment (PD&E) Study to evaluate the potential for providing a new corridor for the missing link of SR 87. The study area, as shown in Figure 1, extends from a southern boundary just north of I-10 along SR 87S; to the intersection of Southridge Road and SR 87N to the north; just west of SR 87N to the west; and just east of SR 87S to the east.

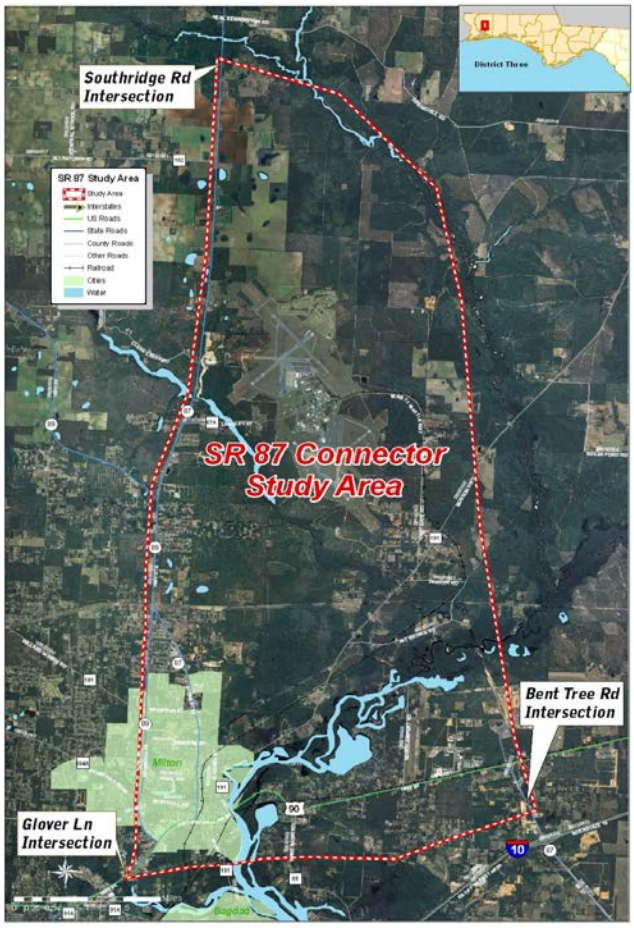


Figure 1: Project Location Map

As part of the SR 87 Connector PD&E Study, a traffic noise study has been conducted. The Public Hearing for the SR 87 Connector PD&E was held November 13, 2014. Comments from the hearing about the proximity of Alternative 2 to homes on the west side of SR 87N, as well as to homes in the newly developed Harvest Point Subdivision, prompted the study team to reevaluate the intersection location of Alternative 2 and SR 87N. After reviewing the public information summary of the public hearing, the study team adjusted Alternative 2 slightly north to a previously reviewed alternative.

The limits of the noise study are from US 90 to SR 87N at Southridge Road The primary objectives of this noise study are to: 1) describe the existing site conditions including noise sensitive land uses within the project study area, 2) document the methodology used to conduct the noise assessment, 3) assess the significance of traffic noise levels on noise sensitive sites for both the No Build and Build Alternatives, and 4) evaluate abatement measures for those noise sensitive sites that approach or exceed FDOT's and Federal Highway Administration's (FHWA) Noise Abatement Criteria (NAC) with the Build Alternatives. The methods and results of the noise study performed for the SR 87 Connector new alternative project are summarized in this report. The information within this report is also intended to provide the technical support for the findings presented in the Project Development Summary Report.

1.1 Purpose and Need for the Project

This project is needed to provide for a new roadway facility linking SR 87S with SR 87N. This will serve as an alternative to the existing shared facility of SR 87 and US 90, which is a constrained facility that is currently operating at a failing level of service [Level of Service (LOS) F]. Therefore, the primary need for this new corridor is to provide additional capacity, and to improve regional connectivity by providing a more direct route from areas of high growth in northern Santa Rosa County, such as the Berryhill Road area, to I-10 and to areas further to the south. Likewise, access will be improved to and from I-10 for the Whiting Field U.S. Naval Air Station, and the County's Joint Use Planning Area near Whiting Field. It is also anticipated that this new roadway facility would provide relief to Ward Basin Road and its intersection with US 90. It is also intended to provide much needed relief to the US 90 Blackwater Bridge.

1.1.1 Emergency Evacuation

SR 87 serves as a vital evacuation route for northbound traffic destined for I-65 in Alabama. The project will address future projected deficiencies on an established emergency hurricane evacuation route.

1.1.2 Multi-modalism

The project will also address the need for greater bicycle and sidewalk connectivity within the County with possible connections with the Blackwater Heritage Trail, enabling area resident's direct access.

1.1.3 Social Demand and Economic Development

Santa Rosa County is not only a bedroom community to the greater Pensacola area, but in its own right, has also been experiencing considerable population growth. This growth has spurred the need for an improved roadway network. The need for the project is also related to committed trips associated with future development in the northern portions of

Santa Rosa County, as well as, the future development on the US 90 corridor, which is hindered by the existing capacity limits of US 90.

1.1.4 Future Growth

As reported by the US Census Bureau 2010 Report, Santa Rosa County continues to be among the fastest growing counties in Florida. This population growth will put further demand on the US 90/SR 87 segment, making growth and evacuation difficult due to a lack of roadway capacity.

1.1.5 Traffic Data

According to the Santa Rosa County Comprehensive Plan, the current adopted LOS standard for US 90 is D. In 2008, US 90 from Ward Basin Road to SR 87N had a failing level of service. Without the proposed improvement, the operating conditions will continue to deteriorate.

1.1.6 Safety/Crash Rates

The SR 87 Connector will include a new roadway to connect SR 87S and SR 87N. Presently, the SR 87 corridor follows along US 90, a congested roadway, for five miles. This portion of the corridor is operating at a LOS F and is the area where the only fatality in the corridor occurred. Improvements to the existing roadway in this vicinity are difficult due to the historic downtown Milton area. By developing a new corridor that does not follow the existing US 90 alternative, the traveler would be able to avoid this high traffic area.

1.1.7 Plan Consistency

The proposed new facility is consistent with the Santa Rosa County Comprehensive Plan, and is also referenced in the County's Capital Improvements Schedule in Policy 4.1.E.3. the proposed new facility is in the Transportation Improvement Plan (TIP) Appendices and in the State Transportation Improvement Plan (STIP), as well as, in the Florida/Alabama TPO five-year work program, and the newly adopted Blueprint 2035 LRTP.

1.2 Project Description

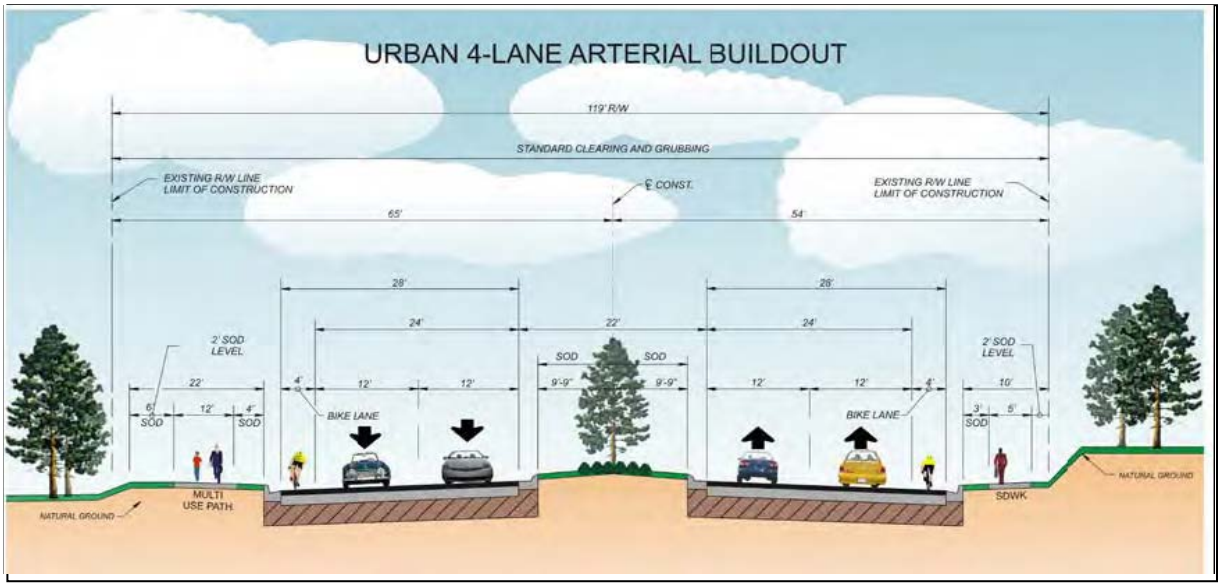
The roadway for the build alternatives is proposed as a four-lane, restricted access, divided highway. The roadway and Blackwater Bridge will be Access Class 3. It is the intent for the project to build an initial two-lane road and as demand warrants the need, the road would be expanded to four lanes. The ultimate build out to four lanes is also desired to match the four-lane section at the existing SR 87S, and at the connection with SR 87N which is also four lane. Most importantly, the four laning of the Connector is pursuant to recent legislation that addresses evacuation routes in Florida's panhandle. (HB 1359-SB 7121) mandates Regional Hurricane Evacuation Route and Shelter improvements for counties north of the US 98 Corridor. HB 1359 stipulates that *"the adopted level of service for out-of-county hurricane evacuation is maintained for a Category 5 storm event as measured on the Saffir-Simpson Scale"*. This is also to comply with rules 9J-5.012(3)(b)(6) and 9J-5.012(3)(b)(7), Florida Administrative Code, by following the process in paragraph (a), that states the level of service shall be no greater than 16 hours for a category 5 storm event.

SR 87 south of the project limits is a four-lane divided urban section. The proposed roadway is intended to match the segment to the south. An urban section will minimize right-of-way impacts and potential impacts to natural lands. As the corridor enters into less constrained areas north of the Blackwater River, a rural section is being recommended. This will allow for slightly higher speeds and be more appropriate for the area's characteristics. As the corridor approaches SR 87N, where land uses become more dense, the corridor is recommended to resume the urban typical section minimizing social impacts.

Future Build-out Urban Section

The future urban section will utilize the interim construction. The crown will be overbuilt to provide a single outside slope for drainage. The interim four foot inside shoulder will be eliminated with the over-build. A twenty-four foot median will be provided for landscaping and turn-bays. Two additional north/west bound travel lanes will be added to the typical, along with a four foot outside shoulder. A five foot sidewalk will be provided with curb and gutter and a three foot parkway. See Figure 2. The urban typical will be used between SR 87S and the bridge over the Blackwater River due to existing right of way constraints, and to match SR 87 between US 90 and I-10. The urban typical will also be used in Alternatives 1 and 2 for the tie back into SR 87N.

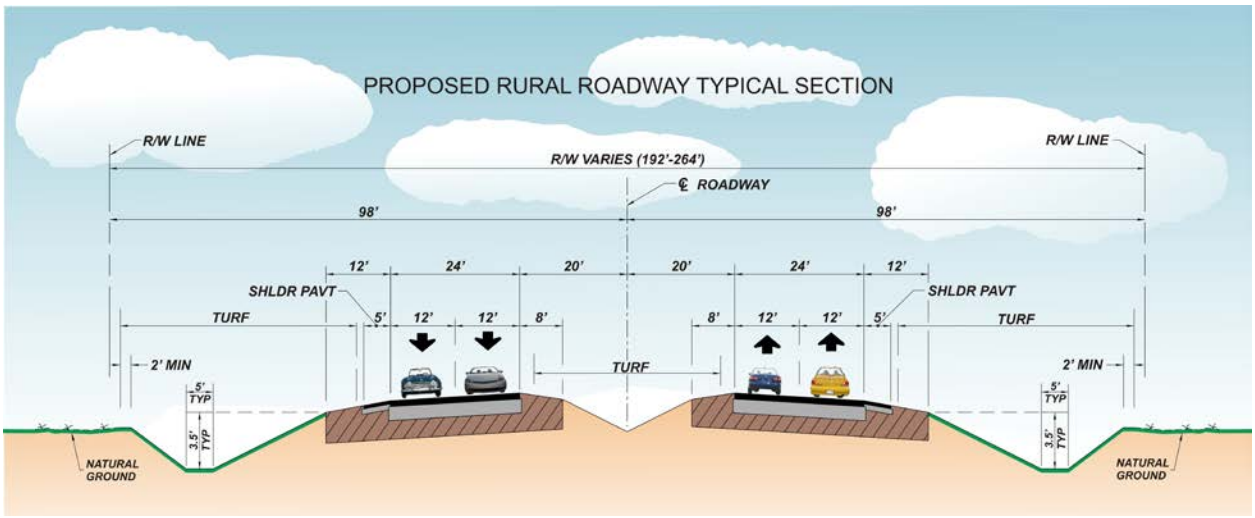
Figure 2 Build-out Urban Typical (4-Lane Arterial)



Future Build-out Rural Section

The future rural section will utilize the interim construction. The crown will be overbuilt to provide a single outside slope for drainage. The interim six and one-half foot inside shoulder will be eliminated with the over-build and replaced with an eight foot shoulder. A forty foot median will be provided for landscaping and turn-bays. Two additional north/west bound travel lanes will be added to the typical, along with a 12 foot (5 foot paved) outside shoulder. See Figure 3. The rural typical will be used between the bridge over the Blackwater River and the urban approaches to SR 87N in both Alternatives 1 and 2.

Figure 3 Build-out Rural Typical (4-Lane Arterial)



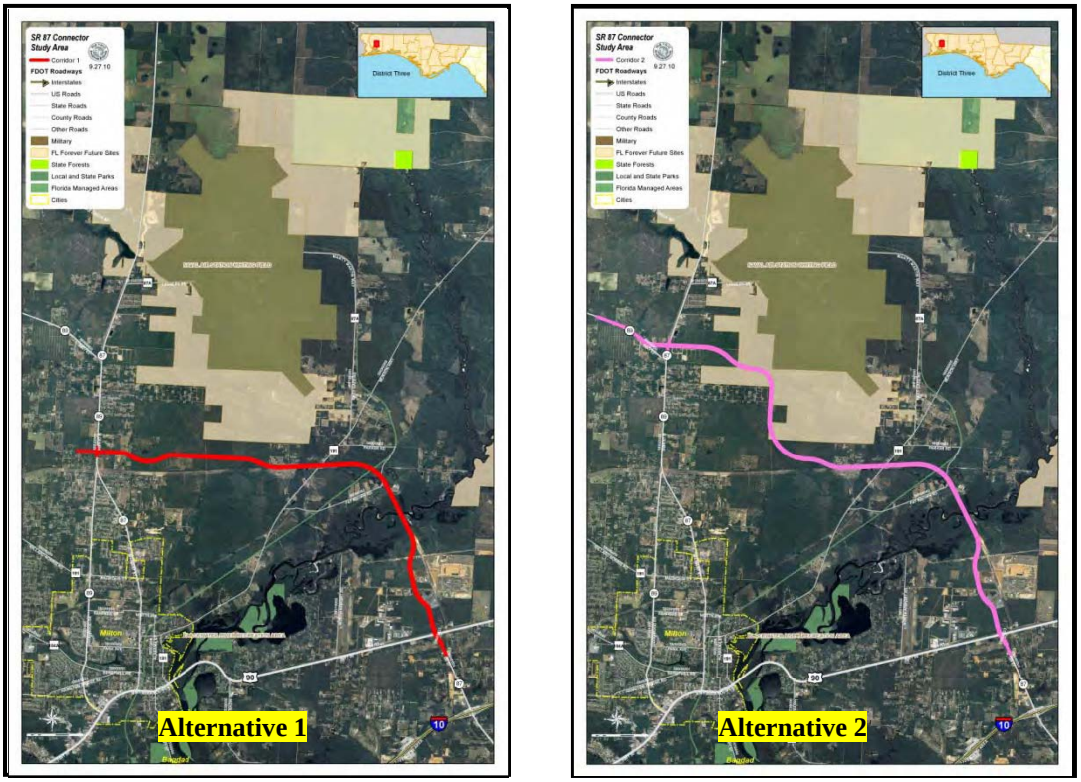
1.3 Build Alternative

In addition to the No-build alternative and the Transportation System Management (TSM) alternative along the existing corridor, a number of new alternatives have been identified and evaluated for improved mobility and safety (see Figure 4 Alternative Maps).

Alternative 1, as shown in the Alternative Maps, will extend north from the US 90/SR 87S intersection crossing the river in proximity of the existing eastern power easement crossings. Once across the river, it will run parallel or adjacent to the power easement, then connect with SR 87N in proximity of the southern split of SR 87N and SR 89, utilizing the Manning Lane right-of-way. This corridor would be roughly 6.5 miles in length.

Alternative 2, much like Alternative 1, will also extend north from the US 90/SR 87S intersection crossing the river in proximity of the eastern most existing power easement crossing. Once across the river, it will run slightly north of Corridor 1, and run adjacent to the Clear Water Creek environmental lands, where it then heads west to connect with SR 87N in proximity of the northern split of SR 87N and SR 89. This corridor would be roughly 7.2 miles in length.

Figure 4: Alternative Maps



2.0 METHODOLOGY

The traffic noise study was performed on the recommended Build Alternatives in accordance with Code of Federal Regulations Title 23 Part 772 (23 CFR 772), *Procedures for Abatement of Highway Traffic Noise and Construction Noise*[1] using methodology established by the FDOT in the *Project Development and Environment Manual*[2], Part 2, Chapter 17 (FDOT, May 24, 2011). The methods and results of this traffic noise analysis are summarized within Sections 2 and 3.

2.1 Model and Noise Metrics

Predicted noise levels are produced using the Federal Highway Administration (FHWA) Traffic Noise Model (TNM), Version 2.5 (2004). This model estimates the acoustic intensity at a noise sensitive receptor site from a series of roadway segments (the source). Model-predicted noise levels are influenced by several factors, such as vehicle speed and distribution of vehicle types. Noise levels are also affected by characteristics of the source-to-receptor site path, including the effects of intervening barriers, structures (houses, trees, etc.), ground surface type (hard or soft), and topography.

Noise levels in the analysis are reported in decibels on the "A" scale [dB(A)]. This scale most closely approximates the response characteristics of the human ear. Noise levels in this analysis are reported as an hourly equivalent sound level [$L_{eq(h)}$] consistent with the noise metric

established by FHWA in 23 CFR 772. $L_{eq(h)}$ is an averaged measurement. The $L_{eq(h)}$ is the equivalent steady state, A-weighted sound level which in an hour would contain the same acoustic energy as the time-varying, A-weighted sound level during the same period. Sound levels of typical noise sources and environments are provided in Table 2.1 as a frame of reference.

2.2 Traffic Data

The traffic data used in the noise analysis was primarily obtained from the SR 87 Connector PD&E Study Design Traffic Technical Memorandum (ATEC, August 2012[3]). Supplemental traffic data was obtained from ATEC and Metric Engineering, Inc. in September and October 2012. The amount of noise generated by traffic is dependent on vehicle speed. LOS C traffic conditions generally represent the maximum traffic volumes that will allow vehicles to travel at the speed limit, which results in the noisiest condition. The traffic volumes used to predict noise levels included the least of either: 1) the traffic capacity of the roadway at LOS C or 2) the projected traffic demand of the roadway. These traffic volumes can be expected to produce the noisiest traffic conditions likely to occur during the design year. For SR 87 Connector, the total truck percentage ranged from 2.50% to 3.85% for existing and future year conditions. Traffic volumes used in the analysis and factors used to split the traffic volumes into vehicle classifications are provided in Appendix A.

Table 2.1: Sound Levels of Typical Noise Sources and Environments

COMMON OUTDOOR ACTIVITIES	NOISE LEVEL dB(A)	COMMON INDOOR ACTIVITIES
	---110---	Rock Band
Jet Fly-over at 1000 ft		
	---100---	
Gas Lawn Mower at 3 ft		
	---90---	
Diesel Truck at 50 ft		Food Blender at 1 m (3 ft)
	---80---	Garage Disposal at 1 m (3 ft)
Noise Urban Area (Daytime)		
Gas Law Mower at 100 ft	**---70---**	Vacuum Cleaner at 10 ft
Commercial Area		Normal Speech at 3 ft
Heavy Traffic at 300 ft	**---60---**	
		Large Business Office
Quiet Urban Daytime	**---50---**	Dishwasher Next Room
Quiet Urban Nighttime	**---40---**	Theater, Large Conference Room
Quiet Suburban Nighttime		(Background)
	---30---	Library
Quiet Rural Nighttime		Bedroom at Night, Concert Hall (Background)
	---20---	
	---10---	
Lowest Threshold of Human Hearing	**---0---**	Lowest Threshold of Human Hearing

Source: California Dept. of Transportation Technical Noise Supplement, Oct. 1998, Page 18.

3.0 TRAFFIC NOISE ANALYSIS

3.1 Noise Sensitive Areas

The FHWA has established Noise Abatement Criteria (NAC) for seven land use activity categories. These criteria determine when an impact occurs and when consideration of noise abatement analysis is required. Criteria noise levels have been established for five of these activity categories. The NAC levels are presented in Table 3.1. Noise abatement measures must be considered when predicted noise levels approach or exceed the NAC levels or when a substantial noise increase occurs. A substantial noise increase occurs when the existing noise level is predicted to be exceeded by 15 dB(A) or more as a result of the transportation improvement project. Because the majority of SR 87 Connector is a new corridor, a substantial increase in traffic noise may occur and will be evaluated for this criterion. The FDOT defines "approach" as within 1 dB(A) of the FHWA criteria.

Table 3.1: Noise Abatement Criteria [Hourly A-Weighted Sound Level-Decibels (dB(A))]

Activity Category	Activity $L_{eq(h)}$[1]		Evaluation Location	Description of Activity Category
	FHWA	FDOT		
A	57	56	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[2]	67	66	Exterior	Residential
C[2]	67	66	Exterior	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	51	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E[2]	72	71	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	--	--	--	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	--	--	--	Undeveloped lands that are not permitted.

(Based on Table 1 of 23 CFR Part 772)

[1] The $L_{eq(h)}$ Activity Criteria values are for impact determination only, and are not a design standard for noise abatement measures.

[2] Includes undeveloped lands permitted for this activity category.

Note: FDOT defines that a substantial noise increase occurs when the existing noise level is predicted to be exceeded by 15 decibels or more as a result of the transportation improvement project. When this occurs, the requirement for abatement consideration will be followed.

The developed and undeveloped lands along the project corridor were evaluated to identify the noise sensitive receptor sites that may be impacted by traffic noise associated with the proposed

new SR 87 Connector. Noise sensitive receptor sites represent any property where frequent exterior human use occurs. This includes residential units (Noise Abatement Activity Category B), other noise sensitive areas including parks and recreational areas, medical facilities, schools, and places of worship (Category C), and commercial properties with exterior areas of use (Category E). Noise sensitive sites also include interior use areas where no exterior activities occur for facilities such as auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, recording studios, schools, and television studios (Category D).

Existing land uses within the project area include commercial, industrial, institutional (criminal justice facility, sheriffs training complex, and juvenile residential facility), recreational, and residences (including lands that have been cleared for development and zoned for residential). The noise sensitive sites identified along the project corridor include:

- Single family residences *(Activity Category B).*
- Recreational Trail *(Activity Category C).*
- Three Institutional facilities *(Activity Category C).*

Activity Category F land uses such as agricultural lands, industrial facilities, maintenance facilities, and retail/commercial lands with no exterior use are also found along the SR 87 Connector corridor. As stated in 23 CFR 772, no noise analysis is required for Activity Category F land uses.

Noise sensitive sites were identified for Alternatives 1 and 2 as described in Table 3.2. Receptors representing noise sensitive sites along the project corridor were grouped into noise sensitive areas (NSAs) based on their geographic location. Noise sensitive sites have been identified on the project concept plans provided in Appendix B. The locations of the NSAs are included in Figure 5 and described below.

Table 3.2: Noise Sensitive Receptor Site Descriptions and Locations

Noise Sensitive Area[1]	Noise Receptor	Map[2] (Sheet #)	Noise Sensitive Receptor Name/Type	Location (Station #)[3]	Dn[4] (ft)	Activity Category	Number of Residences
Alternatives 1 & 2							
NSA 1	R1	1	Residential	102 + 50	300W	B	2
	R2	1	Residential	106 + 00	250W	B	1
	R3	1	Residential	103 + 50	410W	B	1
	R4	1	Residential	106 + 50	335W	B	1
	R5	1	Residential	106 + 50	420W	B	1
	R6	2	Residential	111 + 00	190W	B	1
	R7	4	Santa Rosa County Criminal Justice Facility	138 + 30	150E	C	n/a
	R8	4	Santa Rosa County Sheriff's Office Training Complex	147 + 30	250W	C	n/a
	R9	4	Milton Girls Juvenile Residential Facility & Rec Area	153 + 70	780E	B/C	n/a

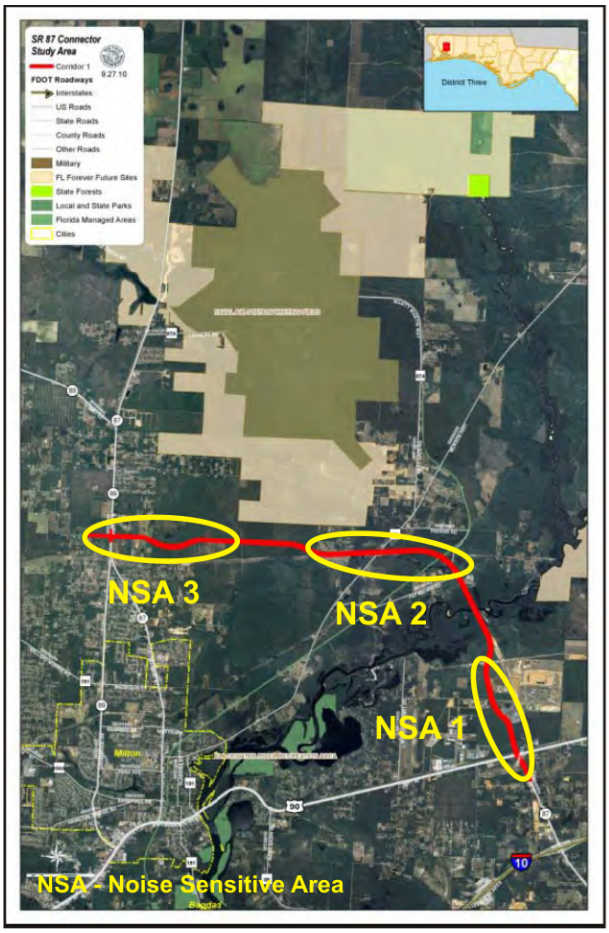
Noise Sensitive Area[1]	Noise Receptor	Map[2] (Sheet #)	Noise Sensitive Receptor Name/Type	Location (Station #)[3]	Dn[4] (ft)	Activity Category	Number of Residences
Alternatives 1 & 2							
NSA2	R11N R11S	5	Blackwater River Heritage State Trail	252 + 00	60NE 60SW	C	n/a
	R12	6	Residential	273 + 00	720NE	B	1
	R13	6	Residential	278 + 00	615N	B	1
	R14	6	Residential	279 + 00	430N	B	1
	R15	6	Residential	282 + 00	610N	B	1
	R16	6	Residential	286 + 00	415N	B	1
	R17	6	Residential	286 + 40	125N	B	1
	R18	6	Residential	288 + 70	430N	B	1
	R19	6	Residential	293 + 60	420S	B	1
	R20	6	Residential	295 + 30	1210S	B	1
	R21	6	Residential	298 + 30	1010S	B	1
	R22	6	Residential	296 + 10	340N	B	1
	R23	6	Residential	296 + 40	460N	B	1
	R24	6	Residential	307 + 70	680S	B	1
	R25	6	Residential	312 + 00	500S	B	1
	R26	6	Residential	311 + 00	280S	B	1
	R27	6	Residential	304 + 30	360N	B	1
	R28	6	Residential	305 + 70	90N	B	1
	R29	6	Residential (within SR 87 Connector proposed ROW)	307 + 30	0	B	1
	R30	6	Residential	308 + 00	80N	B	1
	R31	6	Residential	310 + 60	390N	B	1
	R32	6	Residential	313 + 50	270N	B	1
	R33	6	Residential	317 + 40	280N	B	1
	R34	6	Residential	321 + 00	180N	B	1
Alternative 1							
NSA 3	R35	7	Residential	385 + 60	660S	B	1
	R36	7	Residential	405 + 50	885N	B	1
	R37	7	Residential	411 + 80	585N	B	1
	R38	7	Residential	413 + 10	840N	B	1
	R39	8	Residential	430 + 70	110N	B	1
	R40	8	Residential	434 + 80	550S	B	1
	R41	8	Residential	436 + 10	210S	B	1
	R42	8	Residential	440 + 60	80S	B	1
	R43	8	Residential	444 + 20	470N	B	1
	R44	8	Residential	445 + 50	510N	B	1
	R45	8	Residential	446 + 90	510N	B	1

Noise Sensitive Area[1]	Noise Receptor	Map[2] (Sheet #)	Noise Sensitive Receptor Name/Type	Location (Station #)[3]	Dn[4] (ft)	Activity Category	Number of Residences
NSA 3	R46	8	Residential	448 + 60	515N	B	1
	R48	8	Residential	448 + 80	105N	B	1
	R49	8	Residential	450 + 80	120N	B	1
	R50	8	Residential	451 + 90	130N	B	1
	R51	8	Country Club Condominiums (1-story)	453 + 30	220N	B	3
	R52	8	Country Club Condominiums (1-story)	453 + 15	360N	B	3
	R53	8	Country Club Condominiums (1-story)	453 + 50	420N	B	3
	R54	8	Residential	-	490S	B	1
	R55	8	Residential	-	290S	B	1
	R56	8	Residential	-	130S	B	1
	R57	8	Residential	-	70S	B	1
	R58	8	Residential	-	40S	B	1
Alternative 2							
NSA 4	R59	9	Residential	400 + 20	285W	B	2
	R63	9	Residential	407 + 70	650W	B	3
	R64	9	Residential	409 + 10	620W	B	1
	R65	9	Residential	410 + 10	595W	B	2
	R66	9	Residential	410 + 90	390W	B	5
	R67	9	Residential	411 + 80	550W	B	1
	R68	9	Residential	413 + 40	500W	B	1
	R71	9	Residential	415 + 00	425W	B	1
	R72	9	Residential	415 + 70	150W	B	1
	R73	9	Residential	416 + 20	220W	B	1
	R74	9	Residential	416 + 90	450W	B	1
	R75	9	Residential	417 + 70	550W	B	1
NSA 5	R76	10	Residential	482 + 20	930S	B	1
	R77	10	Residential	482 + 20	840S	B	2
	R78	10	Residential	482 + 60	670S	B	2
	R79	10	Residential	482 + 60	440S	B	1
	R80	10	Residential	483 + 40	460S	B	1
	R81	10	Residential	484 + 60	460S	B	2
	R82	10	Residential	486 + 00	640S	B	2
	R83	10	Residential	484 + 80	760S	B	2
	R84	10	Residential	484 + 40	920S	B	3

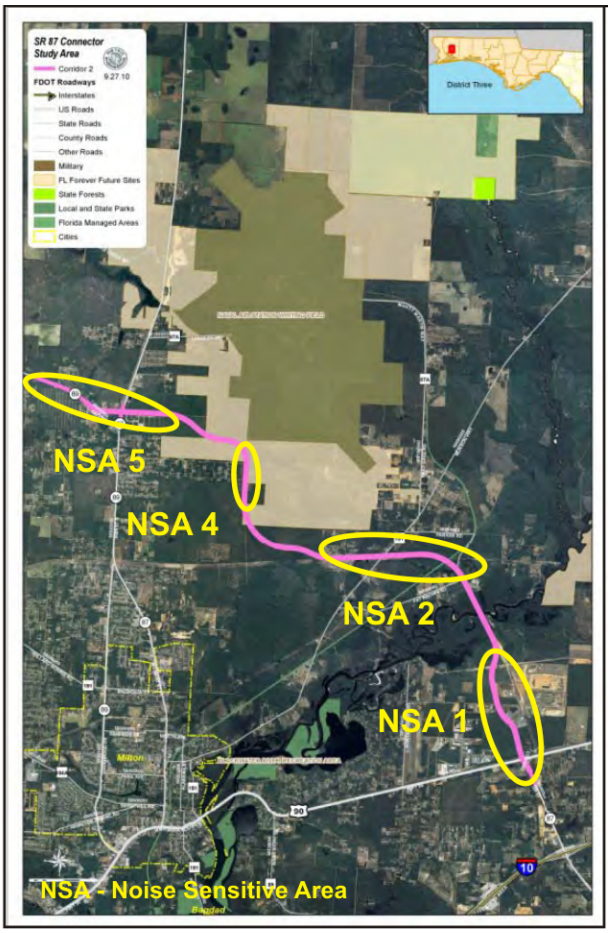
	Noise Receptor	Map[2] (Sheet #)	Noise Sensitive Receptor Name/Type	Location (Station #)[3]	Dn[4] (ft)	Activity Category	Number of Residences
NSA5	R85	10	Residential	488 + 30	880S	B	4
	R86	10	Residential	488 + 30	750S	B	4
	R87	10	Residential	487 + 40	620S	B	1
	R88	10	Residential	488 + 60	610S	B	1
	R89	10	Residential	486 + 40	470S	B	4
	R90	10	Residential	491 + 00	430S	B	6
	R91	10	Residential	491 + 60	620S	B	2
	R92	10	Residential	491 + 60	750S	B	4
	R93	10	Residential	491 + 60	900S	B	4
	R94	10	Residential	495 + 00	900S	B	4
	R95	10	Residential	495 + 00	740S	B	4
	R96	10	Residential	494 + 20	630S	B	1
	R97	10	Residential	495 + 20	620S	B	1
	R98	10	Residential	494 + 00	460S	B	1
	R99	10	Residential	495 + 20	450S	B	2
	R100	10	Residential	497 + 40	490S	B	1
	R101	10	Residential	497 + 60	650S	B	2
	R102	10	Residential	497 + 60	810S	B	2
	R103	10	Residential	498 + 10	970S	B	2
	R104	10	Residential	497 + 60	770S	B	3
	R105	10	Residential	500 + 70	940S	B	2
	R106	10	Residential	507 + 50	420S	B	1
	R107	10	Residential	507 + 50	150N	B	1
	R108	10	Residential	510 + 00	30N	B	1
	R109	10	Residential	512 + 60	180S	B	1
	R110	10	Residential	518 + 40	130S	B	1
	R111	10	Residential	516 + 00	770S	B	1
	R112	10	Residential	517 + 20	720S	B	1
	R113	10	Residential	518 + 40	540S	B	1
	R114	10	Residential	519 + 90	730S	B	2
	R115	10	Residential	526 + 30	260S	B	1
	R116	10	Residential	630 + 10	210S	B	1
TOTAL							162

[1] NSA = Noise Sensitive Area
[2] Appendix B includes project aerials showing the location of the noise sensitive receptor sites
[3] SR 87 Connector station numbers
[4] Dn = Approximate distance to the near travel lane with Design Year 2035 Build roadway conditions
N=north, S=south , E=east, W=west

Figure 5: Noise Sensitive Areas



Alternative 1



Alternative 2

NSA 1 includes the residential area located south of SR 90 and west of SR 87S (Station 100 to Station 112) and the commercial area at Station 110. A total of six noise sensitive receptor sites representing seven single-family residences were modeled. The area continues north SR 90 and along E. Milton Road (Station 115 to Station 160). This area consists of the Santa Rosa County Criminal Justice Facility (juvenile institute maintenance yard, criminal justice facility, sheriff office, jail, and offender registration office), the Santa Rosa County Sheriff Office training complex including three educational rooms and a shooting range, and the Milton Girls Juvenile Residential Facility including a recreational area between the building and SR 97 Connector. There are exterior picnic benches, tables/chairs, and a recreational area located within these complexes that could be sensitive to noise. The project corridor is the same for Build Alternatives 1 & 2 within this area.

NSA 2 represents the area of SR 87 Connecter from the Pat Brown Road area to west of Winston Brown Road (Station 236 to Station 325). The Blackwater Heritage State Trail and 23 single-family residences are located within this area. The project corridor is the same for Build Alternatives 1 & 2 within this area.

NSA 3 is located from approximately 1 mile west of Winston Brown Road to SR 87N at Oakland Drive (Station 383 to Station 455). There are 29 noise sensitive residential sites within this area which includes three condominium buildings and an abandon residential property. Five of the sites are located west of SR 87N and south of Oakland Drive. Sites within NSA 3 represent only Build Alternative 1.

NSA 4 is located within a residential area approximately 1.5 miles east of SR 87N from Station 397 to Station 418. This area includes 20 residences within 600 feet of the proposed SR 87 Connector. Sites within this area represent only Build Alternative 2.

NSA 5 represents the noise sensitive areas within the Harvest Point subdivision at SR 87N and Season Drive (Station 481 to Station 502). This area includes 71 residences within 600 feet of the proposed SR 87 Connector. Sites within this area represent only Build Alternative 2. NSA 5 continues west of SR 87N and adjacent to the Season Drive realignment (Station 507 to Station 530). This area includes 12 residences within 600 feet of the proposed Season Drive realignment. Sites within this area represent only Build Alternative 2.

Representative receptor sites were chosen based on noise sensitivity, roadway proximity, anticipated impacts from the proposed project, and homogeneity (i.e., representative of other similar areas in the project study area). Receptor points representing the noise sensitive sites were located in accordance with the FDOT's *Project Development and Environment Manual*, Part 2, Chapter 17. For single family residences, traffic noise levels were predicted at the edge of the dwelling closest to the travel lane. For the noise sensitive sites with outdoor use, noise levels were predicted where the exterior activity occurs, and for future permitted noise sensitive sites, noise levels were predicted at locations that may contain an outdoor use. The general locations of each representative noise sensitive receptor site are shown on the Project Concept Plans in Appendix B.

3.2 Measured Noise Levels

To verify that traffic noise is the main source of noise and to validate the noise model used (TNM), field measurements were taken within the project area following procedures documented in FHWA's *Measurement of Highway-Related Noise*[4]. Noise levels were measured using a Casella sound level analyzer (CEL-573 series) on January 24, 2012 at one site (NM 1, Station 124+50) within an open area along the existing roadway (E. Milton Road) approximately 1,400 feet north of the SR 87/SR 90 intersection (see Sheet 3 of the project concept plans in Appendix B). The A-weighted frequency scale was used and the sound meter was calibrated to 114 dB(A) using a CEL-284/2 sound-level calibrator. Monitoring was conducted for three-ten minute intervals with the microphone approximately five feet above the land surface. Community noises and traffic information, such as number of passenger cars and trucks and average speeds, were also collected at the time of noise monitoring. A Stalker Radar Gun was used to obtain average operating speeds for cars, medium trucks, heavy trucks, buses, and motorcycles. Since all noise levels in this report are based on a one-hour period, the field-recorded traffic volumes were adjusted upward to reflect hourly volumes. The data collected was then used as input to TNM. The dates, times, and the measured and TNM-predicted noise levels are presented in Table 3.

The TNM model was verified by comparing measured noise levels to levels calculated by the model for the same traffic and site conditions. Measured and modeled noise levels at noise

monitoring station NM1 were within the acceptable 3 decibel range which verifies the model used in this noise study. The measured and modeled L_{eq} noise levels are presented in Table 3.3.

Table 3.3: Noise Monitoring Data and TNM Validation Results

Date:		**January 24, 2012**		
Monitoring Site #:		**NM1**		
Monitoring Location:		**E. Milton Rd. ~1,400' north of SR 87S/SR 90 Intersection**		
Distance to Near Travel Lane (ft):		**50 feet**		
		Run 1	**Run 2**	**Run 3**
Begin Time		08:43	08:55	09:08
End Time		08:53	09:05	09:18
Automobiles (NB)	veh/hr	48	54	54
	speed (mph)	35.6	35.5	34.8
Automobiles (SB)	veh/hr	42	48	0
	speed (mph)	38.0	34.0	0
Medium Trucks (NB)	veh/hr	0	0	6
	speed (mph)	0	0	31.0
Medium Trucks (SB)	veh/hr	0	0	0
	speed (mph)	0	0	0
Heavy Trucks (NB)	veh/hr	0	18	0
	speed (mph)	0	30.3	0
Heavy Trucks (SB)	veh/hr	6	18	0
	speed (mph)	31.0	28.6	0
Buses (NB)	veh/hr	0	0	0
	speed (mph)	0	0	0
Buses (SB)	veh/hr	0	0	0
	speed (mph)	0	0	0
Motorcycles (NB)	veh/hr	0	0	0
	speed (mph)	0	0	0
Motorcycles (SB)	veh/hr	0	0	0
	speed (mph)	0	0	0
Measured $L_{eq(h)}$dB(A)		55.1	60.4	53.7
TNM Predicted $L_{eq(h)}$ dB(A)		54.1	59.4	51.4
Difference $L_{eq(h)}$ dB(A)		1.0	1.0	2.3
Predicted Levels within +/- 3 dB(A) of Monitored Levels		yes	yes	yes

TNM = Traffic Noise Model
NM = noise monitoring site
EB = eastbound
WB = westbound
Veh = vehicles

Field measurements were also taken along the new project corridors to determine the existing (ambient) noise levels at three representative areas within Alternatives 1 and 2 (see Sheets 6, 8, & 9 of the project concept plans in Appendix B). These sites were located within 100 feet of the proposed SR 87 Connector and adjacent to noise sensitive areas. Noise monitoring site 2 (NM 2, Station 314+50) is located west of Winston Brown Road in an open field. Noise monitoring site 3 (NM 3, Station 437) is located approximately 1,900 feet east of SR 87N at the end of Oakland Drive. Noise monitoring 4 (NM 4, Station 408) is located within a forested area next to a

residential subdivision approximately 8,200 feet east of SR 87N. Table 3.4 lists the noise levels at these sites during the monitoring periods.

Table 3.4: Noise Monitoring Data for Sites along Proposed SR 87 Connector

Date:	January 24, 2012		
Site	Measured Noise Level [$L_{eq(h)}$ dB(A)]		
	Run 1	Run 2	Run 3
NM 2			
Begin Time	11:04	11:15	11:26
End Time	11:14	11:25	11:36
Measured noise level	**43.6**	**44.5**	**49.4**
NM 3			
Begin Time	13:36	13:47	13:59
End Time	13:46	13:57	14:09
Measured noise level	**59.6**	**62.4**	**61.4**
NM 4			
Begin Time	14:48	14:59	15:10
End Time	14:58	15:09	15:20
Measured noise level	**55.9**	**52.8**	**56.2**

There are no existing roads adjacent to many of the noise sensitive sites within the project corridor. Therefore, monitored noise levels were used to represent existing conditions at these sites. NM 1 averaged 56.4 dB(A) and was used to represent existing noise levels for receptor sites R7 and R8. NM 2 averaged 45.8 dB(A) and was used to represent existing noise levels for receptor sites R11, R12, and R22 through R34. NM 3 averaged 61.1 dB(A) and was used to represent existing noise levels for receptor sites R35 through R50. NM 4 averaged 55.0 dB(A) and was used to represent existing noise levels for receptor sites R59 through R105 and R110 through R116. For all other receptor sites, TNM-modeled existing noise levels were used for the noise analysis.

3.3 Predicted Noise Levels

TNM was used to predict traffic noise levels at representative noise sensitive receptor sites along the project corridor. Within the project limits, noise sensitive land uses adjacent to SR 87 Connector include institutional (criminal justice facility, sheriffs training complex, and juvenile residential facility), recreational, and residences. All of the noise sensitive sites are classified as Activity Categories B or C as listed on Table 3.1. No industrial or commercial sites with frequent human use are located adjacent to the project corridor. Traffic noise levels were predicted for existing conditions (2010) and the future Design Year (2035) conditions for the No Build and Build Alternatives 1 and 2. The traffic data used in these predictions are presented in Appendix A and the predicted noise levels at these sites are presented in Section 3.4.

3.4 Noise Impact Analysis

Noise levels were predicted at 107 noise sensitive receptor points representing 143 residential sites, three institutional facilities (criminal justice facility, sheriffs training complex, and juvenile residential facility), and a recreational trail (Blackwater Heritage State Trail). Predicted noise levels for these sites are provided within Table 3.5. The locations of the noise sensitive receptor

sites identified on Table 3.5 are depicted on the project concept plans located in Appendix B. The alphanumeric identification for each receptor point associated with a noise sensitive site generally increases in the northbound/westbound direction.

Table 3.5: Predicted Noise Levels for Noise Sensitive Receptor Sites

Noise Sensitive Area[1]	Noise Receptor	Noise Sensitive Receptor Name/Type	Noise Receptor Sites				TNM Predicted Noise Levels dB(A)			Difference Existing to Build dB(A)	Exceeds Criteria
			Location (Station #)[2]	Number of Residences	Activity Category	Noise Abatement Criteria dB(A)	Existing Year[3]	Design Year[4] No Build	Design Year[4] Build		
Alternatives 1 & 2											
NSA 1	R1	Residential	102 + 50	2	B	66	57.7	57.7	60.0	2.3	no
	R2	Residential	106 + 00	1	B	66	59.7	59.7	61.1	1.4	no
	R3	Residential	103 + 50	1	B	66	55.7	55.7	57.8	2.1	no
	R4	Residential	106 + 50	1	B	66	57.4	57.4	59.3	1.9	no
	R5	Residential	106 + 50	1	B	66	55.9	55.9	57.6	1.7	no
	R6	Residential	111 + 00	1	B	66	63.0	63.0	63.8	0.8	no
	R7	Santa Rosa County Criminal Justice Facility	138 + 30	n/a	C	66	**56.4**	**56.4**	65.8	9.4	no
	R8	Santa Rosa County Sheriff's Office Training Complex	147 + 30	n/a	C	66	**56.4**	**56.4**	61.2	4.8	no
	R9	Milton Girls Juvenile Residential Facility & Rec Area	153 + 70	n/a	B/C	66	43.2	43.2	52.0	8.8	no
Alternatives 1 & 2											
NSA 2	R11N	Blackwater Heritage State Trail	252 + 00	n/a	C	66	**45.8**	**45.8**	68.3	22.5	yes
	R11S	Blackwater Heritage State Trail	252 + 00	n/a	C	66	**45.8**	**45.8**	67.5	21.7	yes
	R12	Residential	273 + 00	1	B	66	**45.8**	**45.8**	52.9	7.1	no
	R13	Residential	278 + 00	1	B	66	51.0	51.0	55.4	4.4	no
	R14	Residential	279 + 00	1	B	66	56.1	56.2	59.6	3.5	no
	R15	Residential	282 + 00	1	B	66	63.2	63.2	63.3	0.1	no
	R16	Residential	286 + 00	1	B	66	56.1	56.1	59.2	3.1	no
	R17	Residential	286 + 40	1	B	66	64.0	64.0	67.1	3.1	yes
	R18	Residential	288 + 70	1	B	66	49.5	49.5	57.5	8.0	no
	R19	Residential	293 + 60	1	B	66	62.1	62.1	59.1	-3.0	no
	R20	Residential	295 + 30	1	B	66	59.1	59.1	59.0	-0.1	no
	R21	Residential	298 + 30	1	B	66	60.1	60.1	60.4	0.3	no
	R22	Residential	296 + 10	1	B	66	**45.8**	**45.8**	58.1	12.3	no
	R23	Residential	296 + 40	1	B	66	**45.8**	**45.8**	56.2	10.4	no
	R24	Residential	307 + 70	1	B	66	**45.8**	**45.8**	53.4	7.6	no
	R25	Residential	312 + 00	1	B	66	**45.8**	**45.8**	55.7	9.9	no
	R26	Residential	311 + 00	1	B	66	**45.8**	**45.8**	59.5	13.7	no
	R27	Residential	304 + 30	1	B	66	**45.8**	**45.8**	58.7	12.9	no
	R28	Residential	305 + 70	1	B	66	**45.8**	**45.8**	68.7	22.9	yes
	R29	Residential	307 + 30	1	B	66	**45.8**	**45.8**	--[5]	--[5]	n/a
	R30	Residential	308 + 00	1	B	66	**45.8**	**45.8**	68.9	23.1	yes
	R31	Residential	310 + 60	1	B	66	**45.8**	**45.8**	57.4	11.6	no
	R32	Residential	313 + 50	1	B	66	**45.8**	**45.8**	60.9	15.1	yes
	R33	Residential	317 + 40	1	B	66	**45.8**	**45.8**	60.9	15.1	yes
	R34	Residential	321 + 00	1	B	66	**45.8**	**45.8**	63.8	18.0	yes
Alternative 1											
NSA 3	R35	Residential	385 + 60	1	B	66	**61.1**	**61.1**	53.2	-7.9	no
	R36	Residential	405 + 50	1	B	66	**61.1**	**61.1**	50.2	-10.9	no
	R37	Residential	411 + 80	1	B	66	**61.1**	**61.1**	54.7	-6.4	no
	R38	Residential	413 + 10	1	B	66	**61.1**	**61.1**	51.3	-9.8	no
	R39	Residential	430 + 70	1	B	66	**61.1**	**61.1**	66.7	5.6	yes
	R40	Residential	434 + 80	1	B	66	**61.1**	**61.1**	55.5	-5.6	no
	R41	Residential	436 + 10	1	B	66	**61.1**	**61.1**	62.3	1.2	no
	R42	Residential	440 + 60	1	B	66	**61.1**	**61.1**	65.4	4.3	no
	R43	Residential	444 + 20	1	B	66	**61.1**	**61.1**	56.3	-4.8	no
	R44	Residential	445 + 50	1	B	66	**61.1**	**61.1**	55.7	-5.4	no
	R45	Residential	446 + 90	1	B	66	**61.1**	**61.1**	55.8	-5.3	no
	R46	Residential	448 + 60	1	B	66	**61.1**	**61.1**	56.1	-5.0	no
	R48	Residential	448 + 80	1	B	66	**61.1**	**61.1**	67.0	5.9	yes
	R49	Residential	450 + 80	1	B	66	**61.1**	**61.1**	66.5	5.4	yes
	R50	Residential	451 + 90	1	B	66	**61.1**	**61.1**	66.4	5.3	yes

Noise Sensitive Area[1]	Noise Receptor	Noise Sensitive Receptor Name/Type	Noise Receptor Sites				TNM Predicted Noise Levels dB(A)			Difference Existing to Build dB(A)	Exceeds Criteria
			Location (Station #)[2]	Number of Residences	Activity Category	Noise Abatement Criteria dB(A)	Existing Year[3]	Design Year[4] No Build	Design Year[4] Build		
NSA 3	R51	Country Club Condos	453 + 30	3	B	66	63.3	63.3	65.0	1.7	no
	R52	Country Club Condos	453 + 15	3	B	66	62.6	62.6	63.5	0.9	no
	R53	Country Club Condos	453 + 50	3	B	66	64.1	64.1	64.6	0.5	no
	R54	Residential	-	1	B	66	63.5	63.5	63.8	0.3	no
	R55	Residential	-	1	B	66	57.2	57.2	58.5	1.3	no
	R56	Residential	-	1	B	66	66.8	66.8	67.5	0.7	yes
	R57	Residential	-	1	B	66	63.3	63.3	63.8	0.5	no
	R58	Residential	-	1	B	66	66.1	66.1	66.3	0.2	yes
Alternative 2											
NSA 4	R59	Residential	400 + 20	2	B	66	**55.0**	**55.0**	60.3	5.3	no
	R63	Residential	407 + 70	3	B	66	**55.0**	**55.0**	53.2	-1.8	no
	R64	Residential	409 + 10	1	B	66	**55.0**	**55.0**	53.7	-1.3	no
	R65	Residential	410 + 10	2	B	66	**55.0**	**55.0**	54.3	-0.7	no
	R66	Residential	410 + 90	5	B	66	**55.0**	**55.0**	57.4	2.4	no
	R67	Residential	411 + 80	1	B	66	**55.0**	**55.0**	55.1	0.1	no
	R68	Residential	413 + 40	1	B	66	**55.0**	**55.0**	56.1	1.1	no
	R71	Residential	415 + 00	1	B	66	**55.0**	**55.0**	57.2	2.2	no
	R72	Residential	415 + 70	1	B	66	**55.0**	**55.0**	64.9	9.9	no
	R73	Residential	416 + 20	1	B	66	**55.0**	**55.0**	62.2	7.2	no
	R74	Residential	416 + 90	1	B	66	**55.0**	**55.0**	57.0	2.0	no
	R75	Residential	417 + 70	1	B	66	**55.0**	**55.0**	55.1	0.1	no
Alternative 2											
NSA 5	R76	Residential	482 + 20	1	B	66	**55.0**	**55.0**	48.9	-6.1	no
	R77	Residential	482 + 20	2	B	66	**55.0**	**55.0**	50.2	-4.8	no
	R78	Residential	482 + 60	2	B	66	**55.0**	**55.0**	52.6	-2.4	no
	R79	Residential	482 + 60	1	B	66	**55.0**	**55.0**	56.4	1.4	no
	R80	Residential	483 + 40	1	B	66	**55.0**	**55.0**	56.3	1.3	no
	R81	Residential	484 + 60	2	B	66	**55.0**	**55.0**	56.2	1.2	no
	R82	Residential	486 + 00	2	B	66	**55.0**	**55.0**	53.0	-2.0	no
	R83	Residential	484 + 80	2	B	66	**55.0**	**55.0**	51.0	-4.0	no
	R84	Residential	484 + 40	3	B	66	**55.0**	**55.0**	49.6	-5.4	no
	R85	Residential	488 + 30	4	B	66	**55.0**	**55.0**	49.6	-5.4	no
	R86	Residential	488 + 30	4	B	66	**55.0**	**55.0**	50.9	-4.1	no
	R87	Residential	487 + 40	1	B	66	**55.0**	**55.0**	53.2	-1.8	no
	R88	Residential	488 + 60	1	B	66	**55.0**	**55.0**	53.3	-1.7	no
	R89	Residential	486 + 40	4	B	66	**55.0**	**55.0**	56.1	1.1	no
	R90	Residential	491 + 00	6	B	66	**55.0**	**55.0**	56.4	1.4	no
	R91	Residential	491 + 60	2	B	66	**55.0**	**55.0**	53.4	-1.6	no
	R92	Residential	491 + 60	4	B	66	**55.0**	**55.0**	51.5	-3.5	no
	R93	Residential	491 + 60	4	B	66	**55.0**	**55.0**	49.5	-5.5	no
	R94	Residential	495 + 00	4	B	66	**55.0**	**55.0**	49.9	-5.1	no
	R95	Residential	495 + 00	4	B	66	**55.0**	**55.0**	51.7	-3.3	no
	R96	Residential	494 + 20	1	B	66	**55.0**	**55.0**	53.4	-1.6	no
	R97	Residential	495 + 20	1	B	66	**55.0**	**55.0**	53.7	-1.3	no
	R98	Residential	494 + 00	1	B	66	**55.0**	**55.0**	56.3	1.3	no
	R99	Residential	495 + 20	2	B	66	**55.0**	**55.0**	56.6	1.6	no
	R100	Residential	497 + 40	1	B	66	**55.0**	**55.0**	56.0	1.0	no
	R101	Residential	497 + 60	2	B	66	**55.0**	**55.0**	53.2	-1.8	no
	R102	Residential	497 + 60	2	B	66	**55.0**	**55.0**	51.3	-3.7	no
	R103	Residential	498 + 10	2	B	66	**55.0**	**55.0**	49.8	-5.2	no
	R104	Residential	497 + 60	3	B	66	**55.0**	**55.0**	52.1	-2.9	no
	R105	Residential	500 + 70	2	B	66	**55.0**	**55.0**	51.0	-4.0	no
	R106	Residential	507 + 50	1	B	66	67.4	67.4	67.4	0.0	yes
	R107	Residential	507 + 50	1	B	66	63.0	63.0	64.5	1.5	no
	R108	Residential	510 + 00	1	B	66	54.9	54.9	65.3	10.4	no
	R109	Residential	512 + 60	1	B	66	56.0	56.0	57.7	1.7	no
	R110	Residential	518 + 40	1	B	66	**55.0**	**55.0**	58.0	3.0	no
	R111	Residential	516 + 00	1	B	66	**55.0**	**55.0**	49.5	-5.5	no
	R112	Residential	517 + 20	1	B	66	**55.0**	**55.0**	48.8	-6.2	no
	R113	Residential	518 + 40	1	B	66	**55.0**	**55.0**	49.5	-5.5	no
	R114	Residential	519 + 90	2	B	66	**55.0**	**55.0**	47.1	-7.9	no
	R115	Residential	526 + 30	1	B	66	**55.0**	**55.0**	48.9	-6.1	no
	R116	Residential	630 + 10	1	B	66	**55.0**	**55.0**	50.9	-4.1	no
TOTAL	--	--	--	162	--	--	--	--	--	--	--

[1] NSA = Noise Sensitive Area
[2] SR 87 Connector station numbers
[3] Existing Year - 2010
[4] Design Year - 2035
[5] Receptor site located within proposed ROW

56.5 noise level represents ambient (monitored) conditions

Alternative 1

Noise levels have been predicted at 57 noise sensitive receptor sites within NSA 1, NSA 2, and NSA3 representing 59 residences and four special use areas (criminal justice facility, sheriff's training complex, juvenile residential facility, and a recreational area-Blackwater Heritage State Trail). Predicted noise levels for these sites are provided in Table 3.5. The locations of the noise sensitive receptor sites identified in Table 3.5 are depicted on the project concept plan aerials found in Appendix B. The alphanumeric identification for each receptor point associated with a noise sensitive site generally increases in the northbound / westbound direction.

The Alternative 1 project is proposed to be a new roadway facility linking SR 87S with SR 87N. Therefore, there is no roadway facility along the proposed corridor in the existing year (2010) or the No Build design year (2035). In order to determine background (ambient) noise levels for the noise sensitive sites within NSA 2 and NSA 3, levels were monitored (measured) and used to depict existing and design year No Build noise levels. For the Design Year 2035 No Build condition, noise levels are predicted to approach or exceed the NAC at two noise sensitive sites. For the Design Year 2035 Build condition, noise levels are predicted to approach or exceed the 66 dB(A) NAC at 11 noise sensitive receptor sites. In addition, a substantial noise increase (*when the existing noise level is predicted to be exceeded by 15 dB(A) or more*) occurred at seven receptor sites of which four also had predicted levels over the 66 dB(A) NAC. Since the Build Alternative involves noise impacts, consideration of noise abatement is warranted.

Alternative 2

Noise levels have been predicted at 87 noise sensitive receptor sites within NSA 1, NSA 2, NSA 4, and NSA 5 representing 133 residences and four special use areas (criminal justice facility, sheriffs training complex, juvenile residential facility, and a recreational area-Blackwater Heritage State Trail). Predicted noise levels for these sites are provided in Table 3.5. The locations of the receptor sites identified in Table 3.5 are depicted on the project concept plan aerials found in Appendix B. The alphanumeric identification for each receptor point associated with a noise sensitive site generally increases in the northbound / westbound direction.

The Alternative 2 project is proposed to be a new roadway facility linking SR 87S with SR 87N. Therefore, there is no roadway facility along the proposed corridor in the existing year (2010) or the No Build design year (2035). In order to determine background (ambient) noise levels for the noise sensitive sites within NSA 2, NSA 4, and NSA 5, levels were monitored (measured) and used to depict existing and design year No Build noise levels. For the Design Year 2035 No Build condition, noise levels are predicted to approach or exceed the NAC at one noise sensitive site. For the Design Year 2035 Build condition, noise levels are predicted to approach or exceed the 66 dB(A) NAC at six noise sensitive receptor sites. In addition, a substantial noise increase (*when the existing noise level is predicted to be exceeded by 15 dB(A) or more*) occurred at seven receptor sites of which four also had predicted levels over the 66 dB(A) NAC. Since the Build Alternative involves noise impacts, consideration of noise abatement is warranted.

3.5 Noise Abatement Measures

Abatement is evaluated for all noise sensitive sites predicted to approach or exceed the NAC or when there is a substantial increase (15 dB or more) in traffic noise levels in the design year over the existing noise levels. Amount of noise reduction that could be provided, cost of abatement,

right-of-way availability, safety criteria, construction, and maintenance issues are considered when evaluating abatement measures. Land use controls are identified as a potentially effective abatement measure in any redeveloped or currently undeveloped areas. However, land use controls must be implemented by local planning agencies (i.e., FDOT has no direct control over designating land use in areas adjacent to the highway ROW).

The most common and effective noise abatement measure is the construction of a noise barrier. Barriers reduce noise levels by blocking the sound path between a highway and noise sensitive site. To effectively reduce traffic noise, a barrier must be relatively long, continuous (with no intermittent openings), and of sufficient height. In accordance with 23 CFR Part 772, when traffic noise associated with a proposed project is predicted to approach or exceed the NAC at a noise sensitive site, noise abatement in the form of a noise barrier must be considered and evaluated for feasibility and reasonableness.

For a noise barrier to be considered feasible and cost reasonable, the following minimum conditions should be met:

- A barrier must provide an insertion loss of at least a 5 dB(A) reduction in traffic noise for at least two noise sensitive receptors to be considered benefited.
- A noise barrier must provide a noise reduction of at least 7 dB(A) for at least one impacted receptor.
- The unit cost of the noise barriers is estimated at $\$30/ft^2$. Barrier cost should not exceed $42,000 per benefited noise sensitive site. This is the upper cost limit established by FDOT. A benefited noise sensitive site is defined as a site that would experience at least a 5 dB(A) reduction as a result of providing a noise barrier.

As described in Section 3.4, predicted design year traffic noise levels for Build Alternative 1 will approach or exceed the NAC at 11 noise sensitive receptor sites (residences and recreational trail) and have a substantial increase at an additional three sites along the project corridor. Predicted design year traffic noise levels for Build Alternative 2 will approach or exceed the NAC at six noise sensitive receptor sites (residences and recreational trail) and have a substantial increase at an additional three sites along the project corridor.

In addition to evaluating the cost reasonableness of noise barriers, certain feasibility factors were also considered including accessibility, sight distance, etc. Accessibility refers to the ingress and egress to properties that would be effected by the construction of a noise barrier. Sight distance is a safety issue that refers to the ability of drivers to see far enough in each direction to safely enter the roadway. Sight distance requirements for driveways further reduce the length of noise barriers which reduces the benefits to noise sensitive receptors.

A discussion of the noise barriers evaluated for each noise sensitive area that contains a noise sensitive site with a predicted noise level that approaches or exceeds the NAC for the Build Alternatives is provided below. Table 3.6 summarizes the noise barrier analysis preformed within each NSA. The most economically reasonable barrier evaluated for each NSA for the Build Alternatives are shown on the project concept plans in Appendix B.

NSA 1 (Alternatives 1 & 2) – Receptor Sites R1-R9
Noise levels at the noise receptor sites (R1 through R9) are not predicted to approach or exceed the NAC for the Design Year 2035 Build Alternatives. Compared to existing conditions, no noise sensitive receptor sites are expected to experience a substantial increase in traffic noise as a result of this project. Since the Build Alternatives do not involve noise impacts, noise abatement for these sites was not warranted or recommended.

NSA 2 (Alternatives 1 & 2) – Receptor Sites R11-R34
Noise levels at receptor sites R11, R17, R28, and R30 are predicted to exceed the NAC for the Design Year 2035 Build Alternatives. Compared to existing conditions, noise sensitive receptor sites R11, R28, R30, R32, R33, and R34 are expected to experience a substantial increase in traffic noise as a result of this project. Since the Build Alternatives involve noise impacts, noise abatement for these sites was evaluated.

R11 – There is one special land use area along the project alternative where two noise sensitive receptor sites (R11N and R11S) were located (one on each side of the proposed SR 87 Connector). This area is the Blackwater Heritage Trail (outdoor use) which was evaluated individually using the FDOT publication *A Method to Determine Reasonableness and Feasibility of Noise Abatement at Special Use Locations*[5] (Updated July 22, 2009). Special land uses do not include dwelling residences or Activity Category C as defined by 23 CFR Part 772. Some examples of special land uses are churches, schools, parks, and amphitheaters. A special abatement analysis was conducted to determine the reasonableness and feasibility of a noise barrier at this location. The assumptions used for the special abatement analysis included an average of 300 trail users per day (from the Blackwater Heritage Trail Visitor's Center), an average of one-quarter of an hour time spent next to the proposed SR 87 Connector, 8-foot barrier height, and 812-foot (R11N) and 608-foot (R11S) barrier lengths (see Appendix C for the worksheets). With these criteria, abatement was not reasonable. In addition, two barriers (NSA2-1 and NSA2-2) were evaluated, one along the north alternative and one along the south alternative. The barrier heights were limited to 8 feet since this is a bridge portion of the SR 87 Connector. The barriers provided a 6 dB(A) to 7 dB(A) insertion loss but did not meet the cost reasonableness factor. Therefore, noise abatement was not warranted or recommended.

R17 – This site represents one single family residence located at the intersection of the proposed SR 87 Connector and Munson Highway. The predicted noise level at this site exceeds the NAC for the Design Year 2035. Therefore, a barrier analysis was performed for this site. The proposed barrier (NSA2-6) was predicted for a 14-foot and 22-foot high barrier. This barrier does not provide a noise reduction of 7 dB(A) for at least one impacted receptor nor benefit two or more impacted receptors. Therefore, it was determined to be not feasible (see Table 3.6). Therefore, noise abatement was not warranted or recommended.

R28 and R30 – There are two single family residences located north of Winston Brown Road. The predicted noise level exceeds the NAC for the Design Year 2035. In addition, the noise level is predicted to increase 23 decibels from the existing (ambient) noise level which is considered a substantial increase. Therefore, a barrier analysis was performed for these sites. As listed in Table 3.6, Barrier NSA2-4 exceeds the cost criterion of $42,000 per benefited site. Therefore, this barrier is not cost reasonable and noise abatement was not warranted or recommended.

R32, R33, and R34 – There are three single family residences at this location that do not approach or exceed the NAC for the Design Year 2035 Build Alternative. However, the noise level is predicted to increase 15 to 19 decibels from the existing (ambient) noise level which is considered a substantial increase. Therefore, a barrier analysis was performed for this location. As listed in Table 3.6, a 16-, 18-, and 20-foot barrier (NSA2-5) was able to provide a 6 to 9 dB(A) insertion loss, benefits two or more impacted receptors, and reduces the noise so that there is only a 11 decibel increase from existing levels. However, NSA2-5 exceeds the cost criterion of $42,000 per benefited site. Therefore, this barrier is not cost reasonable and noise abatement was not warranted or recommended.

NSA 3 (Alternative 1) – Receptor Sites R35-R58

Noise levels at receptor sites R39, R48, R49, R50, R56, and R58 are predicted to exceed the NAC for the Design Year 2035 Build Alternatives. Compared to existing conditions, no noise sensitive receptor sites are expected to experience a substantial increase in traffic noise as a result of this project. Since the Build Alternative involves noise impacts, noise abatement for these sites was evaluated.

R39 – There is one single family residence at this location that exceeds the NAC for the Design Year 2035 Build Alternative. Therefore, a barrier analysis was performed for this site. As listed in Table 3.6, a 12- and 14-foot barrier (NSA3-1) was able to provide at least a 7 dB(A) insertion loss. However, NSA3-1 does not benefit two or more impacted receptors and it exceeds the cost criterion of $42,000 per benefited site. Therefore, this barrier is not cost reasonable and noise abatement was not warranted or recommended.

R48, R49, and R50 – There are three single family residences at this location that exceed the NAC for the Design Year 2035 Build Alternative. Therefore, a barrier analysis was performed for this site. As listed in Table 3.6, a 12-, 14-, and 16-foot barrier (NSA3-3) was able to provide at least a 7 dB(A) insertion loss and benefits two or more impacted receptors. However, NSA3-3 exceeds the cost criterion of $42,000 per benefited site. Therefore, this barrier is not cost reasonable and noise abatement was not warranted or recommended.

R56 & R58 – These two single family residences are located at two separate sites that are south of Oakland Drive and west of SR 87N and the proposed SR 87 Connector. Existing noise levels exceed the NAC [66.8 dB(A) at R56 and 66.1 dB(A) at R58]. Future predicted noise levels in the Design Year 2035 increase 0.2 and 0.7 dB(A) [67.5 dB(A) at R56 and 66.3 dB(A) at R58] due to minor intersection improvements along Oakland Drive and SR 87N. Since predicted noise levels exceed the NAC, noise abatement was evaluated for these sites.

Site conditions at R56 prevent the use of a noise barrier to reduce traffic noise levels due to an access driveway located directly in front of R56; therefore, construction of an effective noise barrier would restrict property access at this receptor. In addition, in order for a noise barrier to be considered feasible, a 5 dB(A) reduction or greater needs to be achieved at a minimum of two impacted receptors. R56 and R58 are individual separate residences and will not meet this noise abatement criterion since they include one resident each at separate locations. For these reasons barriers were not considered feasible for these receptors.

NSA 4 (Alternatives 2) – Receptor Sites R59-R75

Noise levels at the noise receptor sites (R59 through R75) are not predicted to approach or exceed the NAC for the Design Year 2035 Build Alternatives. Compared to existing conditions, no noise sensitive receptor sites are expected to experience a substantial increase in traffic noise as a result of this project. Since the Build Alternative does not involve noise impacts, noise abatement for these sites was not warranted or recommended.

NSA 5 (Alternative 2) – Receptor Sites R76-R116

Noise levels at receptor sites R76-R105 and R107-R116 are not predicted to exceed the NAC for the Design Year 2035 Build Alternatives. However, the noise level at receptor site R106 is predicted to exceed the NAC for the Design Year 2035 Build Alternatives. Compared to existing conditions, this noise sensitive receptor site is not expected to experience an increase in traffic noise as a result of this project. Since the Build Alternative involves noise impacts, noise abatement for this site was evaluated.

R106 – There is one single family residence located south of Season Drive and west of SR 87N and the proposed SR 87 Connector that exceeds the NAC for the Design Year 2035 Build Alternative. Therefore, a barrier analysis was performed for this site. The proposed barrier (NSA5-2) was predicted for an 8-, 10-, 12-, 14-, and 22-foot high barrier. This barrier does not provide a noise reduction of 7 dB(A) for at least one impacted receptor nor benefit two or more impacted receptors. Therefore, it was determined to be not feasible (see Table 3.6) and noise abatement is not warranted or recommended.

Table 3.6: Noise Barrier Analysis

Noise Sensitive Area	Barrier #	Barrier Location	Barrier Begin Station	Barrier End Station	Barrier Height (feet)	Barrier Length (feet)	Number of Impacted Receptor Sites	Number of Sites with Insertion Loss of: 5+ dB(A)	6+ dB(A)	7+ dB(A)	8+ dB(A)	9+ dB(A)	10+ dB(A)	Number of Benefited Sites: Impacted	Not Impacted	Total	Barrier Cost	Cost per Benefited Site	Cost Reasonable
NSA2	NSA2-1[1&2] (R11N)	Blackwater River Heritage Trail North	248+50	256+62	8	812	1	Special Use Locations worksheet used (Appendix C)									$3,637,760 ($/person-hour/ft^2)		No
	NSA2-2[1&2] (R11S)	Blackwater River Heritage Trail South	250+50	256+58	8	608	1	Special Use Locations worksheet used (Appendix C)									$2,723,840 ($/person-hour/ft^2)		No
	NSA2-4 (R28, R30)	N. of Winston Brown Road	303+79	309+55	12	576	2	0	2	0	0	0	0	0	0	0	$207,360	--	No
					14	576	2	0	0	2	0	0	0	2	0	2	$241,920	$120,960	No
					16	576	2	0	0	0	3	0	0	2	0	2	$276,480	$138,240	No
	NSA2-5 (R32, R33, 34)	S. of Winston Brown Road	309+75	324+80	14	1505	3	0	2	0	0	0	0	2	0	2	$632,100	$316,050	No
					16	1505	3	1	1	1	0	0	0	3	0	3	$722,400	$240,800	No
					18	1505	3	1	0	2	0	0	0	3	0	3	$812,700	$270,900	No
					20	1505	3	1	0	1	1	0	0	3	0	3	$903,000	$301,000	No
	NSA2-6 (R17)	S. of Munson Highway	285+20	293+20	14	800	1	1	0	0	0	0	0	0	0	0	$336,000	--	No
					22	800	1	1	0	0	0	0	0	0	0	0	$528,000	--	No
NSA 3	NSA3-1 (R39)	~2,400' E. of SR 87N	424+00	438+08	10	1408	1	1	0	0	0	0	0	0	0	0	$422,400	--	No
					12	1408	1	0	0	1	0	0	0	1	0	1	$506,880	$506,880	No
					14	1408	1	0	0	0	1	0	0	1	0	1	$591,360	$591,360	No
	NSA3-3 (R48, R49, R50)	NE of SR 87 Connector & SR 87N Intersection	444+79	452+80	8	801	3	2	0	0	0	0	0	0	0	0	$192,240	--	No
			444+79	452+80	10	801	3	1	1	0	0	0	0	0	0	0	$240,300	--	No
			437+73	452+80	12	1507	3	1	0	2	0	0	0	2	1	3	$542,520	$180,840	No
			441+89	452+80	14	1091	3	1	1	1	1	0	0	3	1	4	$458,220	$114,555	No
			442+79	452+80	16	1001	3	1	0	2	0	1	0	3	1	4	$480,480	$120,120	No
NSA 5	NSA5-2 (R106)	W. of SR 87N & So. of Season Drive	506+80	510+96	8	416	1	0	0	0	0	0	0	0	0	0	$99,914	--	No
			506+80	510+96	10	416	1	0	0	0	0	0	0	0	0	0	$124,892	--	No
			506+80	510+96	12	416	1	0	0	0	0	0	0	0	0	0	$149,871	--	No
			506+80	510+96	14	416	1	0	0	0	0	0	0	0	0	0	$174,849	--	No

[1] Special Use Site (recreational trail)
[2] Proposed barrier on a structure (height limited to 8')

4.0 CONCLUSIONS

The results of the noise impact evaluation are summarized by Alternative in Table 4.1.

Table 4.1: Summary of Noise Impacts

Alternative	Approach or Exceed 66 dB(A)		Increase of 15 dB(A) or More	
	Residences	***Recreational Trail***	***Residences***	***Recreational Trail***
1	9	2	5	2
2	4	2	5	2

Based on impacts to the noise sensitive sites that approached or exceeded NAC, noise abatement measures were evaluated within the project alternative. For this evaluation of noise abatement measures, impacted sites were grouped into five noise sensitive areas (NSA) based on their proximity, similar characteristics, and geography.

Since the Build Alternatives do not involve noise impacts within NSA 1 and NSA 4, consideration of noise abatement was not warranted. Based on predicted noise levels exceeding the NAC, noise barrier evaluations were performed as potential abatement for noise sensitive sites contained in NSA 2, NSA 3, and NSA 5.

The results of the barrier evaluations indicate that the construction of noise barriers within NSA 2, NSA 3, and NSA 5 does not appear to be a cost reasonable method of reducing traffic noise impacts for the proposed SR 87 Connector. Barriers were determined not to be cost reasonable based on the inability of the barriers to provide the minimum required reduction in traffic noise at a cost below the FDOT's guideline of $42,000 per benefited receptor. Therefore, barriers were not warranted or recommended for NSA 2, NSA 3, and NSA 5. Based on the noise analyses performed to date, there appears to be no apparent solutions available to mitigate the noise impacts within NSA 2, NSA 3, and NSA 5 at the locations identified in Table 3.5.

5.0 CONSTRUCTION NOISE AND VIBRATIONS

The early identification of potential construction noise and/or vibration impacts that may result from the construction of the project is important. Any potential construction noise or vibration impacts that are identified in the PD&E phase shall be documented in the Noise Study Report (NSR) and in the environmental clearance document, along with any identified abatement measures that are potentially feasible and reasonable. A list of example construction noise and vibration sensitive receptors has been developed and can be found in Table 17.3 of Chapter 17 of the PD&E Manual. This will allow avoidance and/or mitigation options to be developed during the final design phase. These options can then be placed in the construction plans and applied during the construction of the project by the Contractor.

Land uses adjacent to SR 87 Connector are identified on the FDOT listing of noise- and vibration-sensitive sites (e.g., residences, parks). Construction of the proposed roadway improvements is not expected to have any substantial noise or vibration impact. If additional sensitive land uses develop adjacent to the roadway prior to construction, increased potential for noise or vibration impacts could result. It is anticipated that the application of the ***FDOT***

Standard Specifications for Road and Bridge Construction will minimize or eliminate potential construction noise and vibration impacts. However, should unanticipated noise or vibration issues arise during the construction process, the Project Engineer, in coordination with the District Noise Specialist and the Contractor, will investigate additional methods of controlling these impacts.

6.0 PUBLIC COORDINATION

Coordination with local agencies, officials and the general public is ongoing. The public will have the opportunity to comment on the proposed project at public meetings. Local officials can promote compatibility between land development and highways. This report provides information that can be used by local communities to identify locations where particular types of future land development would be incompatible with anticipated traffic noise levels.

To aid in promoting land use compatibility, a copy of the Noise Study Report, which provides information that can be used to protect future land development from becoming incompatible with anticipated traffic noise levels, will be provided to Santa Rosa County. In addition, generalized future noise impact contours for the properties in the immediate vicinity of the project have been developed for Noise Abatement Categories A, B/C, and E (highly sensitive land uses, residential, sensitive institutional/commercial, and other sensitive land uses, respectively).

These contours represent the approximate distance from the edge of the nearest proposed travel lane of SR 87 Connector to the limits of the area predicted to approach (i.e., within 1 dB(A)) or exceed the NAC in the Design Year 2035. The estimated contours do not account for the effects of elevation, topographic features, shielding of noise by man-made structures, or noise from other roads (i.e., intersecting streets), all of which can cause a variation in the distance to the contour. Within the project alternative the distance between the proposed edge of the outside travel lane and the contours at various locations are presented in Figure 6. To minimize the potential for incompatible land use, noise sensitive land uses should be located beyond the distance provided for the applicable Activity Category.

Figure 6: Noise Contours (Design Year 2035)

Activity Category A

Activity Category B/C

Activity Category E

7.0 REFERENCES

[1] *Procedures for Abatement of Highway Traffic Noise and Construction Noise*, 23 CFR Part 772. Federal Highway Administration. July 13, 2010.

[2] *Project Development and Environment Manual*, Part 2, Chapter 17 Noise. Florida Department of Transportation. May 24, 2011.

[3] *SR 87 PD&E Connector Study Design Traffic Technical Memorandum (Draft)*. Prepared by ATEC (Advanced Transportation Engineering Consultants). August 2012.

[4] *Measurement of Highway-Related Noise.* Federal Highway Administration. May 1996.

[5] *A Method to Determine Reasonableness and Feasibility of Noise Abatement at Special Use Locations*, FL-ER-65-97 (Updated July 22, 2009).

APPENDICES

Appendix A: Traffic Data

Appendix B: Project Concept Plans

Appendix C: Special Use Locations Worksheets

APPENDIX A

Traffic Data

SR 87 Connector PD&E Study
Traffic Data for the Noise Study

Existing (2010) Conditions

Roadway Segment	Two-way Number of Lanes	Two-way AADT		Peak Hour Peak Direction			Design Hr % T	Design Hr % MT	Design Hr % HT	Design Hr % Buses	Design Hr % Motorcycles	K-factor	D-factor	Posted Speed (mph)
		Demand	LOS C MSV	PM Peak Direction	Demand	LOS C MSV								
SR 87S South of US 90	4	9,700	35,500	SB	525	1,890	3.85%	1.45%	1.78%	0.36%	n/a	9.70%	55.80%	45
SR 87S (E. Milton Rd) between US 90 & Pat Brown Rd	2	*no data*	49,600	SB	*no data*	2,560	2.50%	1.25%	1.25%	n/a	n/a	9.40%	58.70%	45
SR 87S between Pat Brown Rd & Munson Hwy	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SR 87 between Munson Hwy & Winston Brown Rd	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SR 87 between Winston Brown Rd & SR 87N (SR 89) at Oakland Dr (Alternative 1)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SR 87 between Winston Brown Rd & SR 87N (SR 89) at Season Dr (Alternative 2)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
US 90 West of SR 87S/E. Milton Rd	2	13,000	15,400	WB	704	820	3.45%	1.55%	1.71%	0.44%	n/a	9.70%	55.80%	45
US 90 East of SR 87S/E. Milton Rd	2	5,800	15,100	EB	314	800	4.65%	1.73%	1.81%	0.47%	n/a	9.70%	55.80%	55
Munson Hwy South of Proposed SR 87S	2	4,500	10,000	SB	244	530	3.50%	1.25%	1.25%	n/a	n/a	9.70%	55.80%	55
Munson Hwy North of Proposed SR 87S	2	4,400	13,860	SB	238	740	3.50%	1.25%	1.25%	n/a	n/a	9.70%	55.80%	55
Oakland Dr West of SR 87N (Alternative 1)	2	1,850	15,100	WB	100	800	2.50%	1.00%	1.00%	n/a	n/a	9.70%	55.80%	35
Season Drive North of SR 89N Intersection (Alternative 2)	2	3,700	15,100	WB	200	800	2.50%	1.00%	1.00%	n/a	n/a	9.70%	55.80%	35
SR 87N/SR 89 South of Proposed SR 87S (Alternative 1)	4	12,800	35,500	NB	729	1,890	2.50%	1.37%	1.00%	0.82%	n/a	9.70%	58.70%	45
SR 87N/SR 89 South of Proposed SR 87S (Alternative 2)	4	12,800	35,500	SB	729	1,890	2.50%	1.25%	1.25%	n/a	n/a	9.70%	58.70%	45
SR 87N/SR 89 North of Proposed SR 87S (Alternative 1)	4	11,100	35,500	SB	632	1,890	2.50%	1.25%	1.25%	n/a	n/a	9.70%	58.70%	45
SR 87N/SR 89 North of Proposed SR 87S (Alternative 2)	4	11,100	35,500	SB	632	1,890	2.50%	1.25%	1.25%	n/a	n/a	9.70%	58.70%	45

No Build (2035) Conditions

Roadway Segment	Two-way Number of Lanes	Two-way AADT		Peak Hour Peak Direction			Design Hr % T	Design Hr % MT	Design Hr % HT	Design Hr % Buses	Design Hr % Motorcycles	K-factor	D-factor	Posted Speed (mph)
		Demand	LOS C MSV	PM Peak Direction	Demand	LOS C MSV								
SR 87S South of US 90	4	17,877	35,500	SB	954	1,890	3.85%	1.45%	1.78%	0.36%	n/a	9.70%	55.80%	45
SR 87S (E. Milton Rd) between US 90 & Pat Brown Rd	2	*no data*	49,600	SB	*no data*	2,560	2.50%	1.25%	1.25%	n/a	n/a	9.40%	58.70%	45
SR 87S between Pat Brown Rd & Munson Hwy	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SR 87 between Munson Hwy & Winston Brown Rd	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SR 87 between Winston Brown Rd & SR 87N (SR 89) at Oakland Dr (Alternative 1)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SR 87 between Winston Brown Rd & SR 87N (SR 89) at Season Dr (Alternative 2)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
US 90 West of SR 87S/E. Milton Rd	2	19,912	15,400	WB	1,062	820	3.45%	1.55%	1.71%	0.44%	n/a	9.70%	55.80%	45
US 90 East of SR 87S/E. Milton Rd	2	7,931	15,100	EB	423	800	4.65%	1.73%	1.81%	0.47%	n/a	9.70%	55.80%	55
Munson Hwy South of Proposed SR 87S	2	6,013	10,000	SB	321	530	3.50%	1.25%	1.25%	n/a	n/a	9.70%	55.80%	55
Munson Hwy North of Proposed SR 87S	2	8,088	13,860	SB	431	740	3.50%	1.25%	1.25%	n/a	n/a	9.70%	55.80%	55
Oakland Dr West of SR 87N (Alternative 1)	2	2,590	15,100	WB	140	800	2.50%	1.00%	1.00%	n/a	n/a	9.70%	55.80%	35
Season Drive North of SR 89N Intersection (Alternative 2)	2	5,180	15,100	WB	280	800	2.50%	1.00%	1.00%	n/a	n/a	9.70%	55.80%	35
SR 87N/SR 89 South of Proposed SR 87S (Alternative 1)	4	26,365	35,500	NB	1407	1,890	2.50%	1.37%	1.00%	0.82%	n/a	9.70%	58.70%	45
SR 87N/SR 89 South of Proposed SR 87S (Alternative 2)	4	26,365	35,500	SB	1,407	1,890	2.50%	1.25%	1.25%	n/a	n/a	9.70%	58.70%	45
SR 87N/SR 89 North of Proposed SR 87S (Alternative 1)	4	16,333	35,500	SB	871	1,890	2.50%	1.25%	1.25%	n/a	n/a	9.70%	58.70%	45
SR 87N/SR 89 North of Proposed SR 87S (Alternative 2)	4	16,333	35,500	SB	871	1,890	2.50%	1.25%	1.25%	n/a	n/a	9.70%	58.70%	45

SR 87 Connector PD&E Study
Traffic Data for the Noise Study

Build (2035) Conditions

Roadway Segment	Two-way Number of Lanes	Two-way AADT		Peak Hour Peak Direction			Design Hr % T	Design Hr % MT	Design Hr % HT	Design Hr % Buses	Design Hr % Motorcycles	K-factor	D-factor	Posted Speed (mph)
		Demand	LOS C MSV	PM Peak Direction	Demand	LOS C MSV								
SR 87S South of US 90 (Alternative 1)	4	25,452	35,500	SB	1,358	1,890	3.85%	1.45%	1.78%	0.36%	n/a	9.70%	55.80%	55
SR 87S South of US 90 (Alternative 2)	4	25,402	35,500	SB	1,355	1,890	3.85%	1.45%	1.78%	0.36%	n/a	9.70%	55.80%	55
SR 87S between US 90 & Pat Brown Rd (Alternative 1)	4	19,746	49,600	NB	1,021	2,560	2.50%	1.25%	1.25%	n/a	n/a	9.40%	58.70%	50
SR 87S between US 90 & Pat Brown Rd (Alternative 2)	4	19,138	49,600	NB	989	2,560	2.50%	1.25%	1.25%	n/a	n/a	9.40%	58.70%	50
SR 87S between Pat Brown Rd & Munson Hwy (Alternative 1)	4	19,746	49,600	NB	1,021	2,560	2.50%	1.25%	1.25%	n/a	n/a	9.40%	58.70%	50
SR 87S between Pat Brown Rd & Munson Hwy (Alternative 2)	4	19,138	49,600	NB	989	2,560	2.50%	1.25%	1.25%	n/a	n/a	9.40%	58.70%	50
SR 87 between Munson Hwy & Winston Brown Rd (Alternative 1)	4	17,121	49,600	WB	885	2,560	2.50%	1.25%	1.25%	n/a	n/a	9.40%	58.70%	50
SR 87 between Munson Hwy & Winston Brown Rd (Alternative 2)	4	15,470	49,600	WB	800	2,560	2.50%	1.25%	1.25%	n/a	n/a	9.40%	58.70%	50
SR 87 between Winston Brown Rd & SR 87N (SR 89) at Oakland Dr (Alternative 1)	4	17,121	49,600	WB	885	2,560	2.50%	1.25%	1.25%	n/a	n/a	9.40%	58.70%	50
SR 87 between Winston Brown Rd & SR 87N (SR 89) at Season Dr (Alternative 2)	4	15,470	49,600	WB	800	2,560	2.50%	1.25%	1.25%	n/a	n/a	9.40%	58.70%	50
US 90 West of SR 87S (Alternative 1)	2	14,825	15,400	WB	791	820	3.45%	1.55%	1.71%	0.44%	n/a	9.70%	55.80%	55
US 90 West of SR 87S (Alternative 2)	2	15,058	15,400	WB	803	820	3.45%	1.55%	1.71%	0.44%	n/a	9.70%	55.80%	55
US 90 East of SR 87S (Alternative 1)	2	8,690	15,100	EB	464	800	4.65%	1.73%	1.81%	0.47%	n/a	9.70%	55.80%	55
US 90 East of SR 87S (Alternative 2)	2	8,692	15,100	EB	464	800	4.65%	1.73%	1.81%	0.47%	n/a	9.70%	55.80%	55
Munson Hwy South of SR 87S (Alternative 1)	2	2,755	10,000	SB	147	530	3.50%	1.25%	1.25%	n/a	n/a	9.70%	55.80%	55
Munson Hwy South of SR 87S (Alternative 2)	2	2,848	10,000	SB	152	530	3.50%	1.25%	1.25%	n/a	n/a	9.70%	55.80%	55
Munson Hwy North of SR 87S (Alternative 1)	2	3,330	13,860	SB	178	740	3.50%	1.25%	1.25%	n/a	n/a	9.70%	55.80%	55
Munson Hwy North of SR 87S (Alternative 2)	2	4,098	13,860	SB	219	740	3.50%	1.25%	1.25%	n/a	n/a	9.70%	55.80%	55
Oakland Dr West of SR 87N (Alternative 1)	2	4,620	15,100	WB	250	800	2.50%	1.00%	1.00%	n/a	n/a	9.70%	55.80%	35
Season Drive North of SR 89N Intersection (Alternative 2)	2	10,160	15,100	WB	550	800	2.50%	1.00%	1.00%	n/a	n/a	9.70%	55.80%	35
SR 87N/SR 89 South of Proposed SR 87S (Alternative 1)	4	30,750	35,500	NB	1,641	1,890	2.50%	1.37%	1.00%	0.82%	n/a	9.70%	58.70%	45
SR 87N/SR 89 South of Proposed SR 87S (Alternative 2)	4	18,039	35,500	SB	962	1,890	2.50%	1.25%	1.25%	n/a	n/a	9.70%	58.70%	45
SR 87N/SR 89 North of Proposed SR 87S (Alternative 1)	4	17,161	35,500	SB	916	1,890	2.50%	1.25%	1.25%	n/a	n/a	9.70%	58.70%	45
SR 87N/SR 89 North of Proposed SR 87S (Alternative 2)	4	16,563	35,500	SB	884	1,890	2.50%	1.25%	1.25%	n/a	n/a	9.70%	58.70%	45

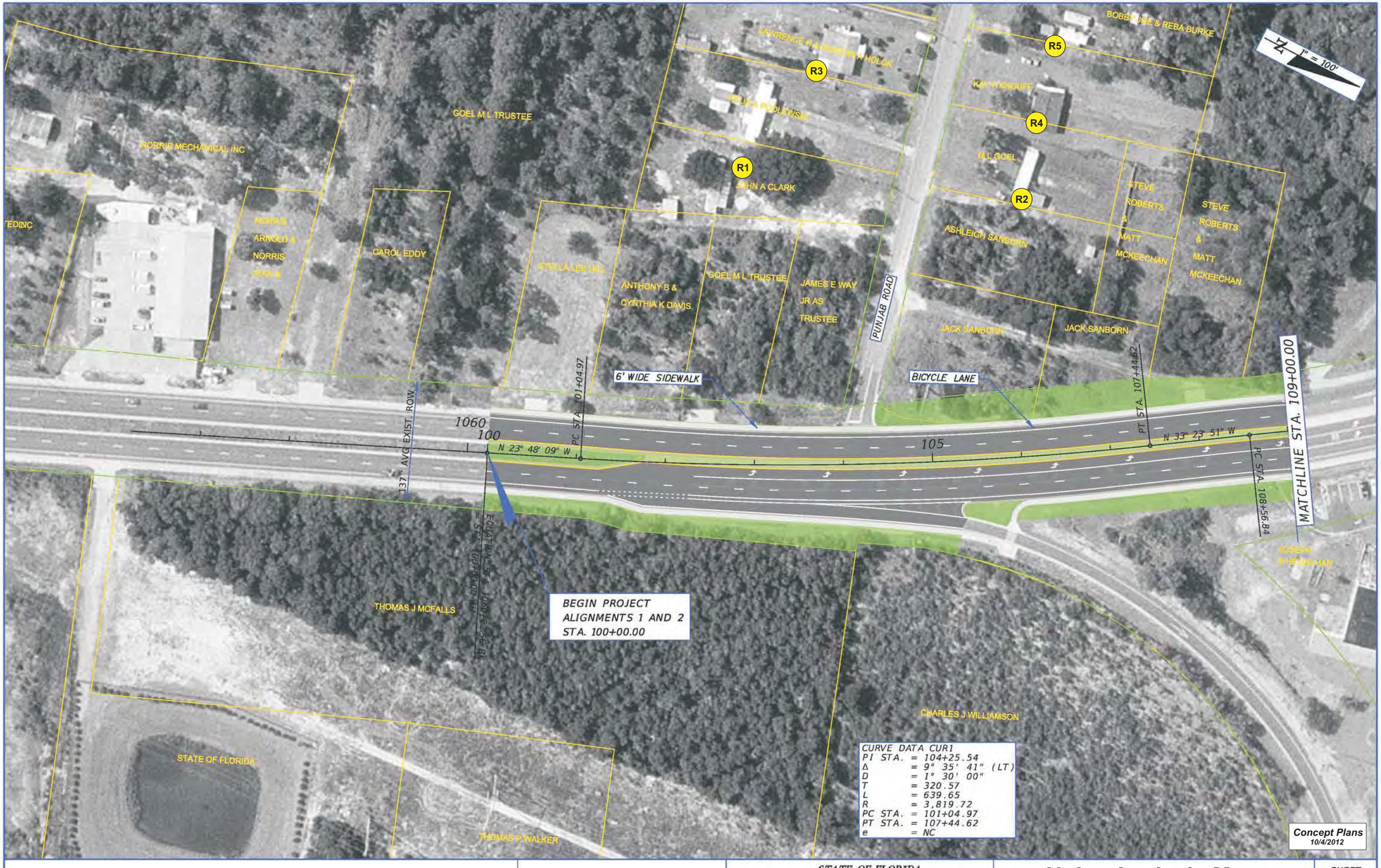
Source: SR 87 Connector PD&E Study Design Traffic Technical Memorandum, ATEC, August 2012 (draft) and ATEC coordination September & October 2012.

Notes:

1. Peak hour truck percentage assumed equal to half of the daily truck percentage consistent with FDOT's traffic handbook methodology.
2. The daily and peak hour truck percentages for the new corridor are assumed to be 5% and 2.5% respectively based on classification counts at nearby stations. Truck percentages assumed divided equally between medium and heavy trucks.

APPENDIX B

Project Concept Plans



R1 Noise Receptor Location

NM1 (Noise Monitoring Site)

Potentially Feasible and Cost Reasonable Noise Barrier Location

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 87	SANTA ROSA	416748-3-22-01, ETC.

Noise Analysis Map

Noise Sensitive Area 1

Alternatives 1 & 2

SHEET NO. 1

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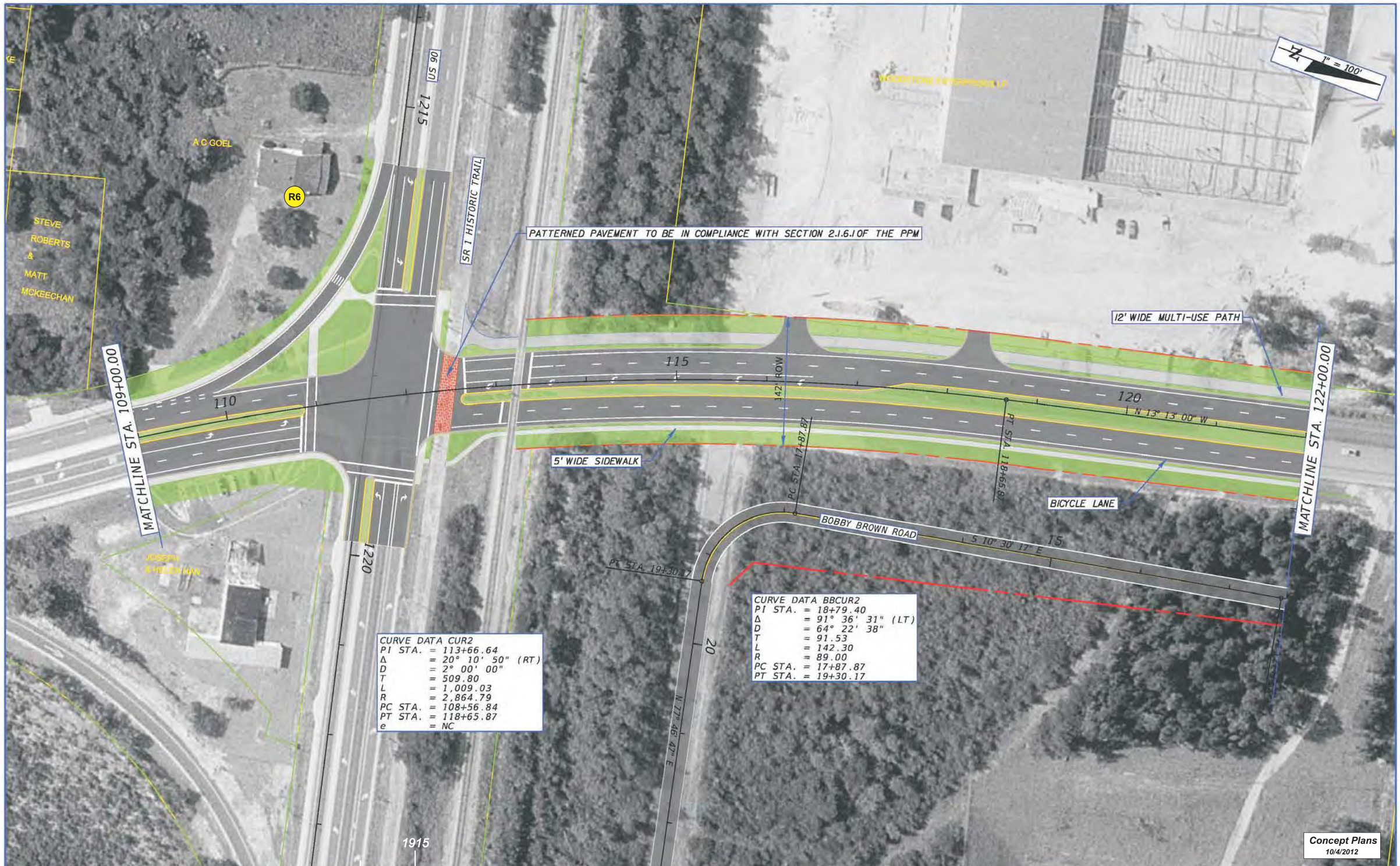

R6 Noise Receptor Location

NM1 (Noise Monitoring Site)

Potentially Feasible and Cost Reasonable Noise Barrier Location

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 87	SANTA ROSA	416748-3-22-01, ETC.

Noise Analysis Map

Noise Sensitive Area 1

Alternatives 1 & 2

SHEET NO. 2

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R1 Noise Receptor Location

NM1 (Noise Monitoring Site)

Potentially Feasible and Cost Reasonable Noise Barrier Location

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 87	SANTA ROSA	416748-3-22-01, ETC.

Noise Analysis Map

Noise Sensitive Area 1

Alternatives 1 & 2

SHEET NO. 3

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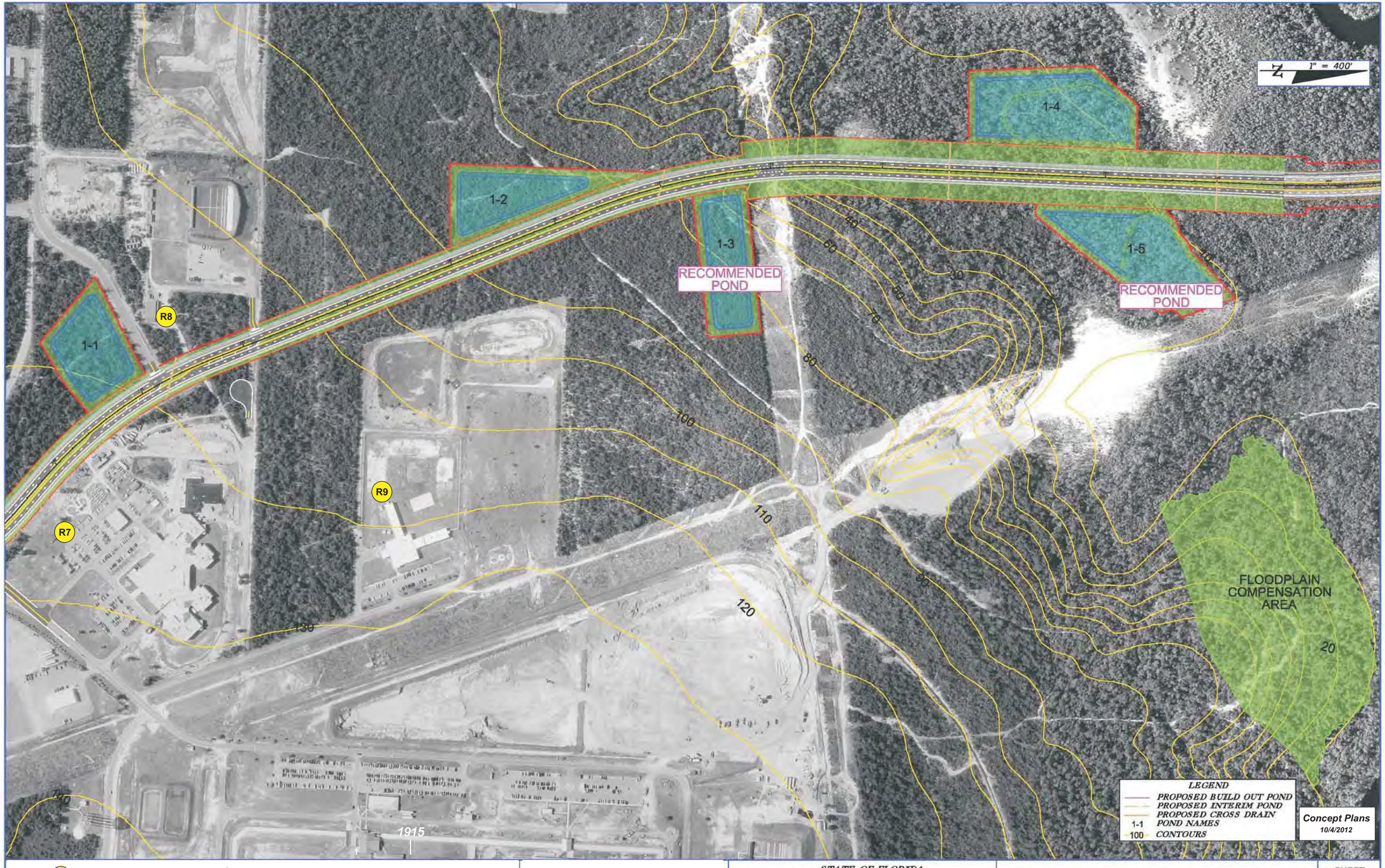

R7 Noise Receptor Location

NM1 (Noise Monitoring Site)

Potentially Feasible and Cost Reasonable Noise Barrier Location

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 87	SANTA ROSA	416748-3-22-01, ETC.

Noise Analysis Map

Noise Sensitive Area 1

Alternatives 1 & 2

SHEET NO. 4

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R11 Noise Receptor Location NM2 (Noise Monitoring Site)

Potentially Feasible and Cost Reasonable Noise Barrier Location

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 87	SANTA ROSA	416748-3-22-01, ETC.

Noise Analysis Map

Noise Sensitive Area 2

Alternatives 1 & 2

SHEET NO. 5

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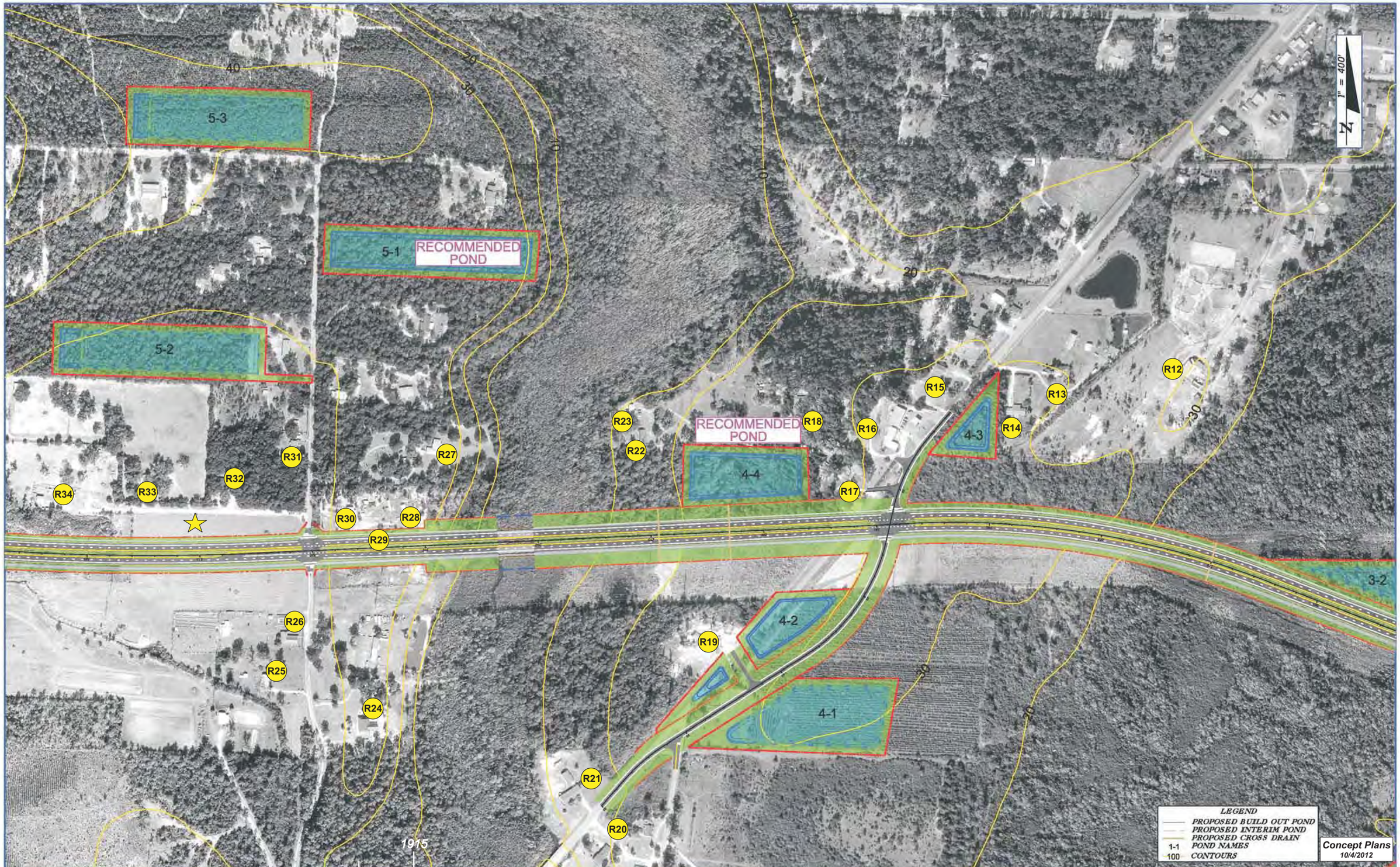

R12 Noise Receptor Location

NM2 (Noise Monitoring Site)

Potentially Feasible and Cost Reasonable Noise Barrier Location

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 87	SANTA ROSA	416748-3-22-01, ETC.

Noise Analysis Map

Noise Sensitive Area 2

Alternatives 1 & 2

SHEET NO. 6

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R36
R38
R37
R35
7-1
7-2
7-3
7-4
RECOMMENDED POND
RECOMMENDED POND
160
150
140
120
1915
1" = 300'
N

LEGEND
PROPOSED BUILD OUT POND
PROPOSED INTERIM POND
PROPOSED CROSS DRAIN
1-1 POND NAMES
100 CONTOURS

Concept Plans
10/4/2012

R35 Noise Receptor Location
NM3 (Noise Monitoring Site)
Potentially Feasible and Cost Reasonable Noise Barrier Location

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 87	SANTA ROSA	416748-3-22-01, ETC.

Noise Analysis Map
Noise Sensitive Area 3
Alternative 1

SHEET NO. 7

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R39 Noise Receptor Location

NM3 (Noise Monitoring Site)

Potentially Feasible and Cost Reasonable Noise Barrier Location

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 87	SANTA ROSA	416748-3-22-01, ETC.

Noise Analysis Map

Noise Sensitive Area 3

Alternative: 1

SHEET NO. 8

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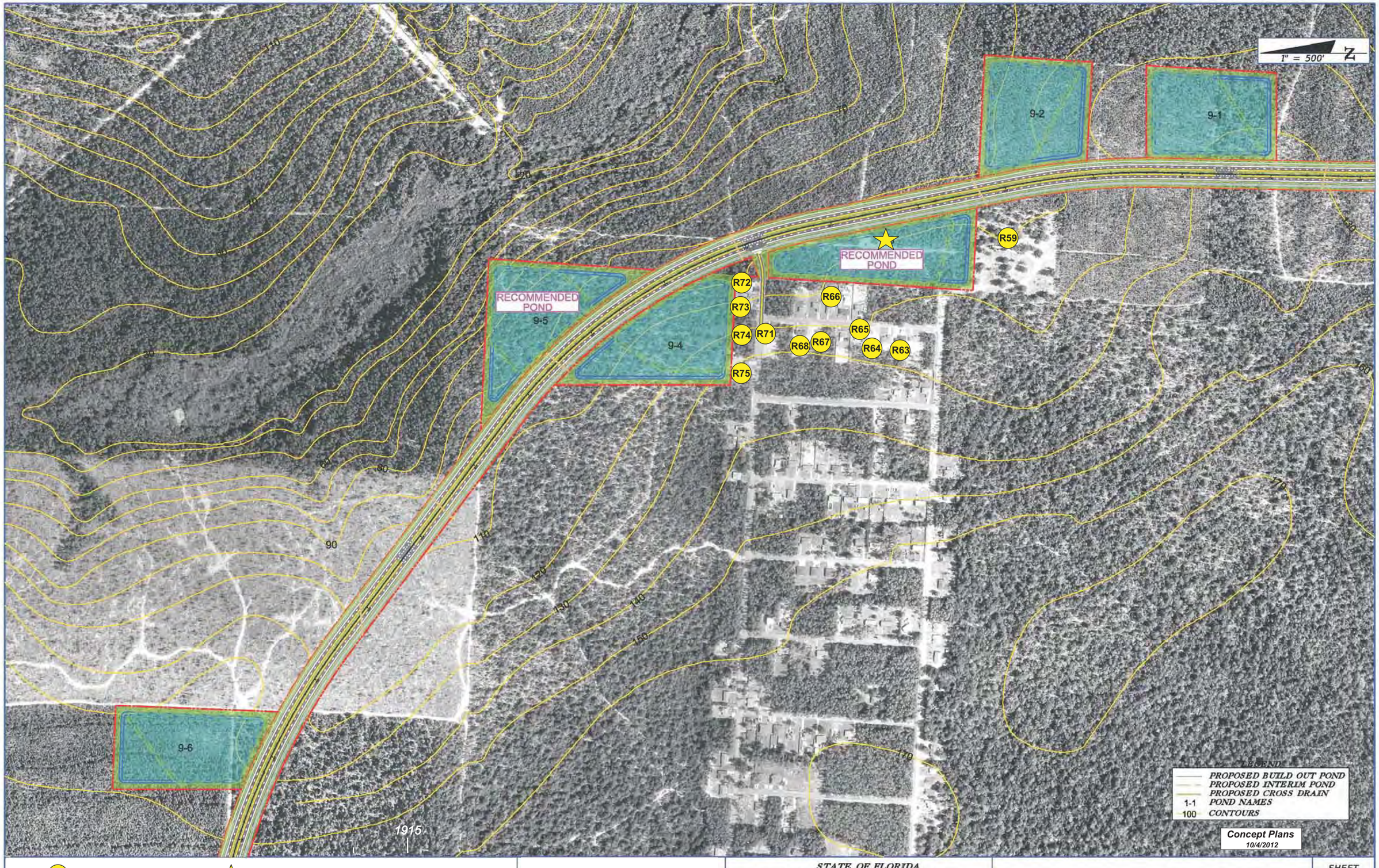

R59 Noise Receptor Location

NM4 (Noise Monitoring Site)

Potentially Feasible and Cost Reasonable Noise Barrier Location

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 87	SANTA ROSA	416748-3-22-01, ETC.

Noise Analysis Map

Noise Sensitive Area 4

Alternative: 2

SHEET NO. 9

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R76 Noise Receptor Location

NM4 (Noise Monitoring Site)

Potentially Feasible and Cost Reasonable Noise Barrier Location

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 87	SANTA ROSA	416748-3-22-01, ETC.

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Noise Analysis Map

Noise Sensitive Area 5

Alternative 2

SHEET NO. 10

APPENDIX C

Special Use Locations Worksheets

SR 87 Connector - Receptor 11N

A Method to Determine Reasonableness and Feasibility of Noise Abatement at Special Use Locations

Directions: Enter the requested values in the space provided below for items 1, 2, 4, and 5, respective to the units desired. The results will be generated automatically in the table below the black line.

Item	Criteria	Input	
		English Units	SI Units
1	Enter length of proposed noise barrier (ft/m)	812	
2	Enter height of proposed noise barrier (ft/m)	8	
4	Enter the average amount of time that a person stays at the site per visit (In hours)	0.25	
5	Enter the average number of people that use this site per day that will receive at least a 5 dB(A) benefit from abatement at the site	300	

*** Do not input any information below this line. Results will be generated automatically in this table based on information input above.**

Item	Criteria	English Units		SI Units	
1	Enter length of proposed noise barrier	812	ft	0	m
2	Enter height of proposed noise barrier	8	ft	0	m
3	Multiply item 1 by item 2	6,496	ft^2	0	m^2
4	Enter the average amount of time that a person stays at the site per visit	0.25	hours	0	hours
5	Enter the average number of people that use this site per day that will receive at least a 5 dB(A) benefit from abatement at the site	300	people	0	people
6	Multiply item 4 by item 5	75	person-hour	0	person-hour
7	Divide item 3 by item 6	87	ft^2/person-hour	#DIV/0!	m^2/person-hour
8	Multiply item 7 by $42,000	$3,637,760	$/person-hour/$ft^2$	#DIV/0!	$/person-hour/$m^2$
9	Does item 8 exceed the "abatement cost factor" of: English Units = $995,935/person-hour/$ft^2$ or SI Units = $92,647/person-hour/$m^2$	YES		#DIV/0!	
10	If item 9 is no, abatement is reasonable			#DIV/0!	
11	If item 9 is yes, abatement is not reasonable	NOT REASONABLE		#DIV/0!	

SR 87 Connector - Receptor 11S

A Method to Determine Reasonableness and Feasibility of Noise Abatement at Special Use Locations

Directions: Enter the requested values in the space provided below for items 1, 2, 4, and 5, respective to the units desired. The results will be generated automatically in the table below the black line.

Item	Criteria	Input	
		English Units	SI Units
1	Enter length of proposed noise barrier (ft/m)	608	
2	Enter height of proposed noise barrier (ft/m)	8	
4	Enter the average amount of time that a person stays at the site per visit (In hours)	0.25	
5	Enter the average number of people that use this site per day that will receive at least a 5 dB(A) benefit from abatement at the site	300	

*** Do not input any information below this line. Results will be generated automatically in this table based on information input above.**

Item	Criteria	English Units		SI Units	
1	Enter length of proposed noise barrier	608	ft	0	m
2	Enter height of proposed noise barrier	8	ft	0	m
3	Multiply item 1 by item 2	4,864	ft^2	0	m^2
4	Enter the average amount of time that a person stays at the site per visit	0.25	hours	0	hours
5	Enter the average number of people that use this site per day that will receive at least a 5 dB(A) benefit from abatement at the site	300	people	0	people
6	Multiply item 4 by item 5	75	person-hour	0	person-hour
7	Divide item 3 by item 6	65	ft^2/person-hour	#DIV/0!	m^2/person-hour
8	Multiply item 7 by $42,000	$2,723,840	$/person-hour/$ft^2$	#DIV/0!	$/person-hour/$m^2$
9	Does item 8 exceed the "abatement cost factor" of: English Units = $995,935/person-hour/$ft^2$ or SI Units = $92,647/person-hour/$m^2$	YES		#DIV/0!	
10	If item 9 is no, abatement is reasonable			#DIV/0!	
11	If item 9 is yes, abatement is not reasonable	NOT REASONABLE		#DIV/0!	